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PART IV:

ENVIRONMENTAL PROTECTION AGENCY

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WATER PROGRAMS

National Interim Primary Drinking Water Regulations

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D—WATER PROGRAMS

[FRL 464–7]

PART 141—NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS

On March 14, 1975, the Environmental Protection Agency (EPA) proposed National Interim Primary Drinking Water Regulations pursuant to sections 1412, 1414, 1415, and 1450 of the Public Health Service Act ("the Act"), as amended by the Safe Drinking Water Act ("SDWA," Pub. L. 93–523), 40 FR 11990. EPA held public hearings on the proposed regulations in Boston, Chicago, San Francisco, and Washington during the month of April. Several thousand pages of comments on the proposed regulations were received and evaluated. In addition, the Agency has received comments and information on the proposed regulations from the National Drinking Water Advisory Council, the Secretary of Health, Education, and Welfare, and from numerous others during meetings with representatives of State agencies, public interest groups and others.

The regulations deal only with the basic legal requirements. Descriptive material will be provided in a guidance manual for use by public water systems and the States.

The purpose of this preamble to the final regulations is to summarize the most significant changes made in the proposed regulations as a result of comments received and the further consideration of available information. A more detailed discussion of the comments and of changes in the proposed regulations is attached as Appendix A.

Water Systems Covered

The Safe Drinking Water Act applies to each "public water system," which is defined in Section 1401(4) of the Act as "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals." Privately owned as well as publicly owned systems are covered. Service "to the public" is interpreted by EPA to include factories and private housing developments. (See generally, House Report, pp. 16–17.)

The definition of "public water system" proposed in the Interim Primary Drinking Water Regulations sought to explain the meaning of the statutory reference to "regular" service. It was proposed to interpret this term as including service for as much as three months during the year. Because the proposed definition would have excluded many large campgrounds, lodges, and other public accommodations which serve large numbers of tourists but which are open for slightly less than three months each year, the definition in the final version covers systems serving an average of at least twenty-five individuals at least 60 days out of the year. The use of a minimum number of days rather than months also makes clear that a system may qualify as a public water system even if it is not open every day during a given month.

Once "public water system" has been defined, it is necessary to define the two major types of public water systems—those serving residents and those serving transients or intermittent users. The possible health effects of a contaminant in drinking water in many cases are quite different for a person drinking the water for a long period of time than for a person drinking the water only briefly or intermittently. Different regulatory considerations may in some cases apply to systems which serve residents as opposed to systems which serve transients or intermittent users. Accordingly, § 141.2(e) makes clear that all "public water systems" fall within either the category of "community water systems" or the category of "non-community water systems." To make clear which regulatory requirements apply to which type of system, the category covered is specifically indicated throughout the regulations.

The proposed regulations defined a "community water system" as "a public water system which serves a population of which 70 percent or greater are residents." Reliance in the proposed definition on the percentage of water system users who are residents would result in treating some fairly large resort communities with many year-round residents as non-community systems. Therefore, the definition of "community water system" has been changed to cover any system which serves at least 15 service connections used by year-round residents or serves at least 25 year-round residents.

Small Community Water Systems

Many community water systems in the country are quite small. Since it is the intention of the Act to provide basically the same level of health protection to residents of small communities as to residents of large cities, and since a number of advanced water treatment techniques are made feasible only by economies of scale, the cost of compliance with the requirements of the Act may pose a serious problem for many small communities. The regulations seek to recognize the financial problems of small communities by requiring more realistic monitoring for systems serving fewer than 1,000 persons. Variances and exemptions authorized by the Act can also assist in dealing with economic problems of small community systems in appropriate cases, at least temporarily. EPA will provide technical assistance on effective treatment techniques which can be used by small systems.

These methods of dealing with the financial problems of some small community systems may not be sufficient in specific instances to make compliance with all applicable regulatory requirements feasible. EPA is commencing a study of potential problems faced by small community systems in meeting applicable requirements under the Act and these regulations, and, if necessary, will make additional adjustments in the Interim Primary Drinking Water Regulations prior to their effective date.

Non-Community Systems

"Non-community systems" are basically those systems which serve transients. They include hotels, motels, restaurants, campgrounds, service stations, and other public accommodations which have their own water system and which have at least 15 service connections or serve water to a daily average of at least 25 persons. Some schools, factories and churches are also included in this category. It is conservatively estimated that there are over 200,000 non-community water systems in the country. However, it should be recognized that while their number is large, they normally are not the principal source of water for the people they serve.

The regulations as proposed would have applied all maximum contaminant levels to non-community systems as well as to community systems. This approach failed to take into account the fact that the proposed maximum contaminant levels for organic chemicals and most inorganic chemicals were based on the potential health effects of long-term exposure. Those levels are not necessary to protect transients or intermittent users. Therefore, the final regulations provide that maximum contaminant levels for organic chemicals, and for inorganic chemicals other than nitrates, are not applicable to non-community systems. An exception was made for nitrates because they can have an adverse health effect on susceptible infants in a short period of time.

Even without monitoring for organic chemicals or most inorganic chemicals, in the initial stages of implementation of the drinking water regulations, monitoring results from tens of thousands of non-community systems could overwhelm laboratory capabilities and other resources. This could delay effective implementation of the regulations with respect to the community systems which provide the water which Americans drink every day. To avoid this result, non-community systems will be given two years after the effective date of the regulations to commence monitoring. In the meantime, non-community systems which already monitor their water are encouraged to continue to do so, and the States are encouraged to take appropriate measures to test or require monitoring for non-community systems that serve large numbers of people.

Of course, non-community systems which pose a threat to health should be dealt with as quickly as possible. The maximum contaminant levels applicable to non-community water systems therefore will take effect 18 months after promulgation, at the same time as levels applicable to community systems. Inspection and enforcement authority will apply to non-community systems at the same time as to community systems.

Sanitary Surveys

EPA encourages the States to conduct sanitary surveys on a systematic basis.

These on-site inspections of water systems are more effective in assuring safe water to the public than individual tests taken in the absence of sanitary surveys. The regulations provide that monitoring frequencies for coliform bacteria can be changed by the entity with primary enforcement responsibility for an individual non-community system, and in certain circumstances for an individual community system, based on the results of a sanitary survey.

Maximum Contaminant Levels

Numerous comments were received by EPA on the substances selected for the establishment of maximum contaminant levels and on the levels chosen. Congress anticipated that the initial Interim Primary Drinking Water Regulations would be based on the Public Health Service Standards of 1962, and this Congressional intent has been followed. Comments received on the various levels did not contain new data sufficient to require the establishment of levels different from those contained in the Public Health Service Standards.

Water Consumption

The maximum contaminant levels are based, directly or indirectly, on an assumed consumption of two liters of water per day. The same assumption was used in the 1962 Standards. This assumption has been challenged because of instances where much higher water consumption rates occur. EPA's justification for using the two-liter figure is that it already represents an above average water or water-based fluid intake. Moreover, while the factor of safety may be somewhat reduced when greater quantities of water are ingested, the maximum contaminant levels based on the two-liter figure provide substantial protection to virtually all consumers. If, as has been suggested, a water consumption rate of eight liters per day is used as the basis for maximum contaminant level, all of the proposed MCL's would have to be divided by four, greatly increasing the monitoring difficulties, and in some cases challenging the sensitivity of accepted analytical procedures. It could be expected, in such a case, that the maximum contaminant levels would be exceeded to a significant degree, and that specialized treatment techniques would be required to order that the contaminant levels would be reduced. The economic impact of a move in this direction would be enormous. It is not technically or economically feasible to base maximum contaminant levels on unusually high consumption rates.

Safety Factors

A question was raised about the fact that different safety factors are contained in various maximum contaminant levels. The levels are not intended to have a uniform safety factor, at least partly because the knowledge of and the nature of the health risks of the various contaminants vary widely. The levels set are the result of experience, evaluation of the available data, and professional judgment. They have withstood the test of time and of professional review. They are being subjected to further review by the National Academy of Sciences in connection with development of data for the Revised Primary Drinking Water Regulations.

MCL's Based on Temperature

A question was also raised as to whether ranges of maximum contaminant levels should be established on the basis of the climate in the area served by the public water system, as was done with fluoride. EPA believes that the use of a temperature scale for fluoride is more appropriate than for other chemicals because of the studies available on the fluoride-temperature relationship and because there is a small margin with fluoride between beneficial levels and levels that cause adverse health effects.

MCL's Deleted

Three proposed maximum contaminant levels have been eliminated in the final regulations because they are not justified by the available data. One of these is carbon chloroform extract (CCE), which is discussed separately below. The others are the proposed levels for the standard bacterial plate count and cyanide. In the case of the plate count, it is believed that the coliform limits contained in the regulations, combined with the turbidity maximum contaminant level, adequately deal with bacterial contamination. However, EPA continues to believe that the standard plate count is a valid indicator of bacteriological quality of drinking water, and recommends that it be used in appropriate cases in conjunction with the coliform tests as an operational tool.

The proposed maximum contaminant level for cyanide was eliminated because the possibility of cyanide contamination can be effectively addressed only by the use of emergency action, such as under Section 1431 of the Act. EPA's 1969 Community Water Supply Study did not reveal a single instance in which cyanide was present in a water system at a level greater than one-thousandth of the level at which cyanide is toxic to humans.

Available data indicate that cyanide will be present in water systems at toxic levels only in the event of an accident, such as a spill from a barge collision. Maximum contaminant levels are not the appropriate vehicle for dealing with such rare, accidental contamination.

Heptachor, heptachlor epoxide and chlordane have also been removed from the list of maximum contaminant levels at least temporarily in view of the pending cancellation and suspension proceedings under the Federal Insecticide, Fungicide and Rodenticide Act involving those pesticides. When the results of these proceedings are available, EPA will again consider whether maximum contaminant levels should be established for those three pesticides.

Sodium and Sulfates

A number of comments were received on the potential health effects of sodium and sulfates. The National Drinking Water Advisory Council has recommended that consideration be given to the monitoring of these constituents, but has not recommended the adoption of maximum contaminant levels because available data do not support the adoption of any specific levels. EPA has requested the National Academy of Sciences to include sodium and sulfates among the contaminants to be studied by NAS, and to include information on the health effects of sodium and sulfates in the report to be made by NAS in December 1976.

Since a number of persons suffer from diseases which are influenced by dietary sodium intake and since there are others who wish to restrict their sodium intake, it is desirable that the sodium content of drinking water be known. Those affected can, by knowing the sodium concentration in their drinking water, make adjustments to their diets or, in extreme cases, seek alternative sources of water to be used for drinking and food preparation. It is recommended that the States institute programs for regular monitoring of the sodium content of drinking water served to the public, and for informing physicians and consumers of the sodium concentration in drinking water.

A relatively high concentration of sulfate in drinking water has little or no known laxative effect on regular users of the water, but transcients using such water sometimes experience a laxative effect. It is recommended that the States institute monitoring programs for sulfates, and that transients be notified if the sulfate content of the water is high. Such notification should include an assessment of the possible physiological effects of consumption of the water.

PCB's and Asbestos

An interagency comment expressed concern for asbestos and PCB's in the environment and noted the need for at least a monitoring requirement, if not for MCL's, for these contaminants. EPA is also concerned, but for the moment lacks sufficient evidence regarding analytical methods, health effects, or occurrence in the environment to establish MCL's. The Agency is conducting research and cooperating in research projects to develop criteria for establishing needed limits as quickly as possible. A monitoring study on a number of organic chemical contaminants, including PCB's, for which MCL's are not being established at this time, will be contained in an organic chemical monitoring regulation that is being promulgated with these regulations. Regarding asbestos, HEW and EPA are sponsoring a number of studies this year at an approximate cost of $16 million to establish health effects, anayltical methods and occurrence.

Point of Measurement

Other comments on maximum contaminant levels focused on the proposed requirement that such levels be tested at the consumer's tap. Concern was expressed over the inability of the public water system to control potential sources

of contaminants which are under the control of the consumer.

The promulgated definition of "maximum contaminant level," § 141.2(d), retains the requirement that the maximum contaminant level be measured at the tap except in the case of turbidity, which should be measured at the point of entry to the distribution system. However, the definition has been expanded to make clear that contaminants added to the water by circumstances under the control of the consumer are not the responsibility of the supplier of water, unless the contaminants result from corrosion of piping and plumbing resulting from the quality of the water supplied. It should be noted, however, that this requirement should not be interpreted as to discourage local, aggressive cross connection control measures.

Coliform Bacteria MCL's

The promulgated MCL's for coliform bacteria are basically the 1962 Public Health Service Standards, with minor refinements and clarifications. However, further changes may be desirable. For example, the MCL's for the membrane filter analytical method do not resolve the question of how many coliform bacteria are assumed to be present in a single highly contaminated sample. Some laboratories assume an upper limit of 50, while others seek to continue to count individual bacteria to a level of 100 or even higher in a single sample. The upper limit assumed will affect the monthly average which is calculated to determine compliance with the MCL's.

Another question relating to the coliform bacteria MCL's is the matter of possible spurious positive samples. As the regulations are written, all routine samples taken to determine compliance with the MCL's must be counted, regardless of the results of analysis of any check samples that may be taken. The reason for this is that bacterial contamination is often intermittent or transient, and as a result negative check samples taken a day or more after a positive sample cannot demonstrate that the positive result was in error. It may be possible, however, to prescribe a means of dealing with spurious positive results without compromising the integrity of the MCL's.

A third question concerning the MCL's for coliform bacteria is the relationship of monthly averages of coliform bacteria levels to monthly percentages of positive samples. For example, the monthly average MCL for the membrane filter method is violated if the monthly average exceeds one coliform bacterium per sample. However, for purposes of determining whether the monthly-percentage-of-positive-samples MCL is violated, a sample is counted as positive only if it contains more than four coliform bacteria. Thus, it is possible, particularly when a relatively small number of samples is taken, for a system to fail the monthly average MCL even when no single sample taken during the month is out of compliance with the limit.

These and other questions concerning the coliform bacteria MCL's will be reviewed further by EPA. If review indicates that changes in the MCL's are desirable, those changes will be made as soon as possible but within 6 months, in time to take effect at the same time as the initial Interim Primary Drinking Water Regulations.

Organic Chemicals

The proposed maximum contaminant levels for organic pesticides, other than the three which are the subject of cancellation and suspension proceedings, have been retained. It is anticipated that additional organic pesticides will be added to the regulations if surveys of pesticides in drinking water being conducted by EPA indicate that this is needed.

The proposed regulations also contained a maximum contaminant level for organic chemicals obtained by the carbon chloroform extract (CCE) method. It was anticipated by Congress that organic chemicals would be dealt with primarily in the Revised Primary Drinking Water Regulations because of the paucity of accurate data on the health effects of various organic chemicals, the large number of such chemicals, uncertainities over appropriate treatment techniques, and the need for additional information on the incidence of specific organic chemicals in drinking water supplies. EPA thought that the CCE standard might provide an appropriate means of dealing with organic chemicals as a class pending action on the Revised Primary Regulations.

The CCE standard was originally developed as a test for undesirable tastes and odors in drinking water. As concern developed over the health effects of organic chemicals, the possibility of using CCE as a health standard rather than an esthetic standard was considered.

As pointed out by numerous comments, CCE has many failings as an indicator of health effects of organic chemicals. To begin with, the test obtains information on only a fraction of the total amount of organic chemicals in the water sampled. Furthermore, there is serious question as to the reliability of CCE in identifying those organic chemicals which are most suspected of adverse health effects. In addition, there are no existing data on which a specific level for CCE can be established on a rational basis. To establish a maximum contaminant level under these circumstances would almost certainly do more harm than good. It could give a false sense of security to persons served by systems which are within the established level and a false sense of alarm to persons served by systems which exceed the level. It also would divert resources from efforts to find more effective ways of dealing with the organic chemicals problem.

EPA believes that the intelligent approach to the organic chemicals question is to move ahead as rapidly as possible along two fronts. First, EPA is adopting simultaneously with these regulations a Subpart E of Part 141, containing requirements for organic chemical monitoring pursuant to Sections 1445 and 1450 of the Act.

The regulations require that designated public water systems collect samples of raw and treated water for submission to EPA for organics analysis. EPA will analyze the samples for a number of broad organic parameters, including carbon chloroform extract (CCE), volatile and non-volatile total organic carbon (VTOC and NVTOC), total organic chlorine (TOCl), ultraviolet absorbancy, and fluorescence. In addition, monitoring will be required for probably 21 specific organic compounds. Selection of the specific compounds has been based on the occurrence or likelihood of occurrence in treated water, toxicity data and availability of practical analytical methods. Laboratory analyses will be used to evaluate the extent and nature of organic chemical contamination of drinking water, to evaluate the validity of the general organic parameters as surrogates for measures of harmful organic chemicals, and to determine whether there is an adequate basis for establishing maximum contaminant levels for specific organics or groups of organics.

Second, EPA is embarking on an intensive research program to find answers to the following four questions:

1. What are the effects of commonly occurring organic compounds on human health?

2. What analytical procedures should be used to monitor finished drinking water to assure that any Primary Drinking Water Regulations dealing with organics are met?

3. Because some of these organic compounds are formed during water treatment, what changes in treatment practices are required to minimize the formation of these compounds in treated water?

4. What treatment technology must be applied to reduce contaminant levels to concentrations that may be specified in the Primary Drinking Water Regulations?

This research will involve health-effects and epidemiological studies, investigations of analytical methodology, and pilot plant and field studies of organic removal unit processes. Some phases of the research are to be completed by the end of this year, while much of the remainder are to be completed within the next calendar year.

As soon as sufficient information is derived from the monitoring program and related research, the Interim Primary Drinking Water Regulations will be amended so that the organic chemicals problem can be dealt with without delay. The monitoring process will be completed within 1 year.

During the interim period, while satisfactory MCL's for organic contamination in drinking water are being developed, EPA will act in specific cases where appropriate to deal with organic contamination. If the EPA monitoring program reveals serious specific cases of contamination, EPA will work with State and local authorities to identify the source and nature of the problem and to

take remedial action. EPA will also aid the States in identifying additional community water supplies that require analysis.

PUBLIC NOTICE

The public notice requirements proposed in § 141.32 did not distinguish between community and non-community public water systems. They would have required that public notice of non-compliance with applicable regulations be made by newspaper, in water bills, and by other media for all public water systems. These requirements are inappropriate and ineffective in the case of most non-community water systems. Those systems principally serve transients who do not receive water bills from the system and who probably are not exposed significantly to the local media. A more effective approach would be to require notice that can inform the transient before he drinks the system's water, and thereby both warn the transient and provide an incentive to the supplier of water to remedy the violation. Accordingly, Section 141.32 as adopted provides that in the case of non-community systems, the entity with primary enforcement responsibility shall require that notice be given in a form and manner that will insure that the public using the public water system is adequately informed.

The proposed public notice requirements also failed to distinguish between different types of violations of the Interim Primary Drinking Water Regulations. Since the urgency and importance of a notice varies according to the nature of the violation involved, § 141.32 as promulgated seeks to match the type of notice required with the type of violation involved. Written notice accompanying a water bill or other direct notice by mail is required for all violations of the regulations, including violations of monitoring requirements, and for the grant of a variance or exemption. In addition, notice by newspaper and notification to radio and television stations is required whenever a maximum contaminant level is exceeded, or when the entity with primary enforcement responsibility requires such broader notice.

QUALITY CONTROL AND TESTING PROCEDURES

Section 1401(1) of the Act defines "primary drinking water regulation" to include "quality control and testing procedures." The promulgated regulations include testing requirements for each maximum contaminant level, including check samples and special samples in appropriate cases. The regulations also specify the procedures to be followed in analyzing samples for each of the maximum contaminant levels. These procedures will be updated from time to time as advances are made in analytical methods. For example, references to "Standard Methods for the Examination of Water and Wastewater" are to the current, 13th, edition, but these references will be changed to cite the 14th edition when it is available in the near future.

A key element of quality control for public water systems is accurate laboratory analysis. Section 141.28 of the regulations provides that analyses conducted for the purpose of determining compliance with maximum contaminant levels must be conducted by a laboratory approved by the entity with primary enforcement responsibility. EPA will develop as soon as possible, in cooperation with the States and other interested parties, criteria and procedures for laboratory certification. A State with primary enforcement responsibility will have a laboratory certified by EPA pursuant to the prescribed criteria and procedures, and in turn will certify laboratories within the State.

Record-keeping requirements and reports to the State also will assist in quality control efforts.

RECORD-KEEPING

Adequate record-keeping is necessary for the proper operation and administration of a public water system. It is also important for providing information to the public, providing appropriate data for inspection and enforcement activities and providing information on which future regulations can be based. Accordingly, a new § 141.33 has been added to the regulations to require that each public water system maintain records of sample analyses and of actions to correct violations of the Primary Drinking Water Regulations.

ECONOMIC AND COST ANALYSIS

A comprehensive economics study has been made of the Interim Primary Drinking Water Regulations. This study estimates the costs of the regulations, evaluates the potential economic impact, and considers possible material and labor shortages. The results of this analysis are summarized here.

Total investment costs to community water systems to achieve compliance with these regulations are estimated to be between $1,050 and $1,765 million. It is estimated that non-community systems will invest an additional $24 million. The range of the estimate is due to uncertainty as to the design flow that will be used in installing treatment facilities. Systems not in compliance will have to consider sizing their new components to reflect average daily flow conditions, or maximum daily flow conditions in cases where system storage is not adequate.

This investment will be spread over several years. Investor-owned systems will bear about one-fourth of these costs, and publicly-owned systems the remainder. It is not anticipated that systems will have difficulty financing these capital requirements.

In annual terms, national costs are expected to be within the following ranges:

	In millions
Capital costs	$146–247
Operations and maintenance	263–363
Monitoring (routine only)	17– 35
Total	$426–545

Although these aggregate figures are large, most water consumers will not be significantly affected. For those users in systems serving 10,000 persons or more, the average annual treatment cost per capita may increase from less than $1.00 for systems requiring disinfection and lead control, to between $15 to $35 for control of turbidity and heavy metal removal. For systems serving less than 100 persons, the average annual per capita costs of disinfection, lead control and fluoride/arsenic removal are estimated to be between $2.10 and $11.80. However, if turbidity control or heavy metal removal were required in a system of this size then costs are expected to range from $52 to $237 per year per capita. EPA is aware of the serious potential economic impact on users in these small systems. However, the legislative history specifies that the regulations should be based on costs that can be reasonably afforded by large metropolitan or regional systems. Further economic evaluation of these systems is being conducted, and realistic options for these small systems are being reviewed. Options that will be under consideration include less costly treatment technologies; formation of regional systems; and use of alternative water sources. Industrial and commercial users, whether providing their own water or using public systems, are not expected to be significantly affected by these regulations.

Possible constraints to the implementation of the interim primary regulations were examined. Although there will be an increase in demand for chemicals, manpower, laboratories, and construction of treatment facilities, it is not anticipated that any of these factors will be a serious obstacle to implementation of these regulations over a reasonable time frame.

For the reasons given above, Chapter 40 of the Code of Federal Regulations is hereby amended by the addition of the following new Part 141. These regulations will take effect 18 months after promulgation.

(It is hereby certified that the economic and inflationary impacts of these regulations have been carefully evaluated in accordance with Executive Order 11821)

Dated: December 10, 1975.

RUSSELL E. TRAIN,
Administrator.

Subpart A—General

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AUTHORITY: Secs. 1412, 1414, 1445, and 1450 of the Public Health Service Act, 88 Stat. 1660 (42 U.S.C. 300g–1, 300g–3, 300j–4, and 300j–9).

Subpart A—General

§ 141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93–523); and related regulations applicable to public water systems.

§ 141.2 Definitions.

As used in this part, the term:

(a) "Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93–523.

(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

(c) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

(d) "Person" means an individual, corporation, company, association, partnership, State, municipality, or Federal agency.

(e) "Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "non-community water system."

(i) "Community water system" means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

(ii) "Non-community water system" means a public water system that is not a community water system.

(f) "Sanitary survey" means an on-site review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

(g) "Standard sample" means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

(h) "State" means the agency of the State government which has jurisdiction over public water systems. During any period when a State does not have primary enforcement responsibility pursuant to Section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

(i) "Supplier of water" means any person who owns or operates a public water system.

§ 141.3 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

(a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to Sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility. Provisions under Part 142, *National Interim Primary Drinking Water Regulations Implementation*—subpart E (Variances) and subpart F (Exemptions)—apply where EPA has primary enforcement responsibility.

§ 141.5 Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

§ 141.6 Effective date.

The regulations set forth in this part shall take effect 18 months after the date of promulgation.

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The maximum contaminant level for nitrate is applicable to both community water systems and non-community water systems. The levels for the other inorganic chemicals apply only to community water systems. Compliance with maximum contaminant levels for inorganic chemicals is calculated pursuant to § 141.23.

(b) The following are the maximum contaminant levels for inorganic chemicals other than fluoride:

Contaminant	*Level, milligrams per liter*
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

(c) When the annual average of the maximum daily air temperatures for the location in which the community water system is situated is the following, the maximum contaminant levels for fluoride are:

Temperature Degrees Fahrenheit	Degrees Celsius	Level, milligrams per liter
53.7 and below	12.0 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

§ 141.12 Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. They apply only to community water systems. Compliance with maximum contaminant levels for organic chemicals is calculated pursuant to § 141.24.

	Level, milligrams per liter
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4, 4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8 - dimethano naphthalene).	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer).	0.004
Methoxychlor (1,1,1-Trichloro-2, 2 - bis [p-methoxyphenyl] ethane).	0.1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67–69 percent chlorine).	0.005

(b) Chlorophenoxys:	
2,4 - D, (2,4-Dichlorophenoxyacetic acid).	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	0.01

§ 141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or

(3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

§ 141.14 Maximum microbiological contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(a) When the membrane filter technique pursuant to § 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:

(1) One per 100 milliliters as the arithmetic mean of all samples examined per month pursuant to § 141.21 (b) or (c);

(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.

(b) (1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 10 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 60 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) five portions in more than one sample when less than five samples are examined per month; or

(iii) five portions in more than 20 percent of the samples when five or more samples are examined per month.

(c) For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with paragraphs (a), (b)(1), or (b)(2) of this section shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one-month period.

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with § 141.14. Analyses shall be conducted in accordance with the analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 662–688, except that a standard sample size shall be employed. The standard sample used in the membrane filter procedure shall be 100 milliliters. The standard sample used in the 5 tube most probable number (MPN) procedure (fermentation tube method) shall be 5 times the standard portion. The standard portion is either 10 milliliters or 100 milliliters as described in § 141.14 (b) and (c). The samples shall be taken at points which are representative of the conditions within the distribution system.

(b) The supplier of water for a community water system shall take coliform density samples at regular time intervals, and in number proportionate to the population served by the system. In no event shall the frequency be less than as set forth below:

Population served:	*Minimum number of samples per month*
25 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 9,400	10
9,401 to 10,300	11
10,301 to 11,100	12
11,101 to 12,000	13
12,001 to 12,900	14
12,901 to 13,700	15
13,701 to 14,600	16
14,601 to 15,500	17
15,501 to 16,300	18
16,301 to 17,200	19
17,201 to 18,100	20
18,101 to 18,900	21
18,901 to 19,800	22
19,801 to 20,700	23
20,701 to 21,500	24
21,501 to 22,300	25
22,301 to 23,200	26
23,201 to 24,000	27
24,001 to 24,900	28
24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 33,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,001 to 50,000	55
50,001 to 54,000	60
54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260
780,001 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470
3,960,001 to 4,310,000	480
4,310,001 to 4,690,000	490
4,690,001 or more	500

Based on a history of no coliform bacterial contamination and on a sanitary survey by the State showing the water system to be supplied solely by a protected ground water source and free of sanitary defects, a community water system serving 25 to 1,000 persons, with written permission from the State, may reduce this sampling frequency except that in no case shall it be reduced to less than one per quarter.

(c) The supplier of water for a non-community water system shall sample for coliform bacteria in each calendar quarter during which the system provides water to the public. Such sampling shall begin within two years after the effective date of this part. If the State, on the basis of a sanitary survey, determines that some other frequency is more appropriate, that frequency shall be the frequency required under these regulations. Such frequency shall be confirmed or changed on the basis of subsequent surveys.

(d) (1) When the coliform bacteria in a single sample exceed four per 100 milliliters (§ 141.14(a)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency estab-

lished by the State, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

(2) When coliform bacteria occur in three or more 10 ml portions of a single sample (§ 141.14(b)(1)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(3) When coliform bacteria occur in all five of the 100 ml portions of a single sample (§ 141.14(b)(2)), at least two daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(4) The location at which the check samples were taken pursuant to paragraphs (d)(1), (2), or (3) of this section shall not be eliminated from future sampling without approval of the State. The results from all coliform bacterial analyses performed pursuant to this subpart, except those obtained from check samples and special purpose samples, shall be used to determine compliance with the maximum contaminant level for coliform bacteria as established in § 141.14. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with § 141.21 (b) or (c).

(e) When the presence of coliform bacteria in water taken from a particular sampling point has been confirmed by any check samples examined as directed in paragraphs (d)(1), (2), or (3) of this section, the supplier of water shall report to the State within 48 hours.

(f) When a maximum contaminant level set forth in paragraphs (a), (b) or (c) of § 141.14 is exceeded, the supplier of water shall report to the State and notify the public as prescribed in § 141.31 and § 141.32.

(g) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with § 141.14 or § 141.21 (b) or (c).

(h) A supplier of water of a community water system or a non-community water system may, with the approval of the State and based upon a sanitary survey, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by paragraph (b) of this section, *Provided*, That the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determinations of chlorine residual. When the supplier of water exercises the option provided in this paragraph (h) of this section, he shall maintain no less than 0.2 mg/l free chlorine throughout the public water distribution system. When a particular sampling point has been shown to have a free chlorine residual less than 0.2 mg/l, the water at that location shall be retested as soon as practicable and in any event within one hour. If the original analysis is confirmed, this fact shall be reported to the State within 48 hours. Also, if the analysis is confirmed, a sample for coliform bacterial analysis must be collected from that sampling point as soon as practicable and preferably within one hour, and the results of such analysis reported to the State within 48 hours after the results are known to the supplier of water. Analyses for residual chlorine shall be made in accordance with "Standard Methods for the Examination of Water and Wastewater," 13th Ed., pp. 129–132. Compliance with the maximum contaminant levels for coliform bacteria shall be determined on the monthly mean or quarterly mean basis specified in § 141.14, including those samples taken as a result of failure to maintain the required chlorine residual level. The State may withdraw its approval of the use of chlorine residual substitution at any time.

§ 141.22 Turbidity sampling and analytical requirements.

(a) Samples shall be taken by suppliers of water for both community water systems and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with § 141.13. The measurement shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 350–353, or "Methods for Chemical Analysis of Water and Wastes," pp. 295–298, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(b) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in § 141.31 and § 141.32.

(c) Sampling for non-community water systems shall begin within two years after the effective date of this part.

(d) The requirements of this § 141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.

§ 141.23 Inorganic chemical sampling and analytical requirements.

(a) Analyses for the purpose of determining compliance with § 141.11 are required as follows:

(1) Analyses for all community water systems utilizing surface water sources shall be completed within one year following the effective date of this part. These analyses shall be repeated at yearly intervals.

(2) Analyses for all community water systems utilizing only ground water sources shall be completed within two years following the effective date of this part. These analyses shall be repeated at three-year intervals.

(3) For non-community water systems, whether supplied by surface or ground water sources, analyses for nitrate shall be completed within two years following the effective date of this part. These analyses shall be repeated at intervals determined by the State.

(b) If the result of an analysis made pursuant to paragraph (a) indicates that the level of any contaminant listed in § 141.11 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) The provisions of paragraphs (b) and (c) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to § 141.31 and shall notify the public pursuant to § 141.32.

(e) For the initial analyses required by paragraph (a)(1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within 3 years prior to the effective date of this part may be substituted at the discretion of the State.

(f) Analyses conducted to determine compliance with § 141.11 shall be made in accordance with the following methods:

(1) Arsenic—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 95–96, Environ-

mental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(2) Barium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, or "Methods for Chemical Analysis of Water and Wastes," pp. 97–98, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(3) Cadmium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, or "Methods for Chemical Analysis of Water and Wastes," pp. 101–103, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(4) Chromium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, or "Methods for Chemical Analysis of Water and Wastes," pp. 105–106, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(5) Lead—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210–215, or "Methods for Chemical Analysis of Water and Wastes," pp. 112–113, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(6) Mercury—Flameless Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 118–126, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(7) Nitrate—Brucine Colorimetric Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 461–464, or Cadmium Reduction Method, "Methods for Chemical Analysis of Water and Wastes," pp. 201–206, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(8) Selenium—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," p. 145, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(9) Silver—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater", 13th Edition, pp. 210–215, or "Methods for Chemical Analysis of Water and Wastes", p. 146, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(10) Fluoride—Electrode Method, "Standard Methods for the Examination of Water and Wastewater", 13th Edition, pp. 172–174, or "Methods for Chemical Analysis of Water and Wastes," pp. 65–67, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or Colorimetric Method with Preliminary Distillation, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 171–172 and 174–176, or "Methods for Chemical Analysis of Water and Wastes," pp. 59–60, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

§ 141.24 Organic chemical sampling and analytical requirements.

(a) An analysis of substances for the purpose of determining compliance with § 141.12 shall be made as follows:

(1) For all community water systems utilizing surface water sources, analyses shall be completed within one year following the effective date of this part. Samples analyzed shall be collected during the period of the year designated by the State as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at intervals specified by the State but in no event less frequently than at three year intervals.

(2) For community water systems utilizing only ground water sources, analyses shall be completed by those systems specified by the State.

(b) If the result of an analysis made pursuant to paragraph (a) of this section indicates that the level of any contaminant listed in § 141.12 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) For the initial analysis required by paragraph (a) (1) and (2) of this section, data for surface water acquired within one year prior to the effective date of this part and data for ground water acquired within three years prior to the effective date of this part may be substituted at the discretion of the State.

(e) Analyses made to determine compliance with § 141.12(a) shall be made in accordance with "Method for Organochlorine Pesticides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

(f) Analyses made to determine compliance with § 141.12(b) shall be conducted in accordance with "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

§ 141.27 Alternative analytical techniques.

With the written permission of the State, concurred in by the Administrator of the U.S. Environmental Protection Agency, an alternative analytical technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by this part.

§ 141.28 Approved laboratories.

For the purpose of determining compliance with § 141.21 through § 141.27, samples may be considered only if they have been analyzed by a laboratory approved by the State except that measurements for turbidity and free chlorine residual may be performed by any person acceptable to the State.

§ 141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

Subpart D—Reporting, Public Notification and Record Keeping

§ 141.31 Reporting requirements.

(a) Except where a shorter reporting period is specified in this part, the supplier of water shall report to the State within 40 days following a test, measurement or analysis required to be made by this part, the results of that test, measurement or analysis.

(b) The supplier of water shall report to the State within 48 hours the failure to comply with any primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

(c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.

§ 141.32 Public notification.

(a) If a community water system fails to comply with an applicable maximum contaminant level established in Subpart B, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, or fails to perform any monitoring required pursuant to Section 1445 (a) of the Act, the supplier of water shall notify persons served by the system of the failure or grant by inclusion of a notice in the first set of water bills of the system issued after the failure or grant

and in any event by written notice within three months. Such notice shall be repeated at least once every three months so long as the system's failure continues or the variance or exemption remains in effect. If the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made by or supplemented by another form of direct mail.

(b) If a community water system has failed to comply with an applicable maximum contaminant level, the supplier of water shall notify the public of such failure, in addition to the notification required by paragraph (a) of this section, as follows:

(1) By publication on not less than three consecutive days in a newspaper or newspapers of general circulation in the area served by the system. Such notice shall be completed within fourteen days after the supplier of water learns of the failure.

(2) By furnishing a copy of the notice to the radio and television stations serving the area served by the system. Such notice shall be furnished within seven days after the supplier of water learns of the failure.

(c) If the area served by a community water system is not served by a daily newspaper of general circulation, notification by newspaper required by paragraph (b) of this section shall instead be given by publication on three consecutive weeks in a weekly newspaper of general circulation serving the area. If no weekly or daily newspaper of general circulation serves the area, notice shall be given by posting the notice in post offices within the area served by the system.

(d) If a non-community water system fails to comply with an applicable maximum contaminant level established in Subpart B of this part, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirement of any schedule prescribed pursuant to a variance or exemption or fails to perform any monitoring required pursuant to Section 1445(a) of the Act, the supplier of water shall given notice of such failure or grant to the persons served by the system. The form and manner of such notice shall be prescribed by the State, and shall insure that the public using the system is adequately informed of the failure or grant.

(e) Notices given pursuant to this section shall be written in a manner reasonably designed to inform fully the users of the system. The notice shall be conspicuous and shall not use unduly technical language, unduly small print or other methods which would frustrate the purpose of the notice. The notice shall disclose all material facts regarding the subject including the nature of the problem and, when appropriate, a clear statement that a primary drinking water regulation has been violated and any preventive measures that should be taken by the public. Where appropriate, or where designated by the State, bilingual notice shall be given. Notices may include a balanced explanation of the significance or seriousness to the public health of the subject of the notice, a fair explanation of steps taken by the system to correct any problem and the results of any additional sampling.

(f) Notice to the public required by this section may be given by the State on behalf of the supplier of water.

(g) In any instance in which notification by mail is required by paragraph (a) of this section but notification by newspaper or to radio or television stations is not required by paragraph (b) of this section, the State may order the supplier of water to provide notification by newspaper and to radio and television stations when circumstances make more immediate or broader notice appropriate to protect the public health.

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of bacteriological analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

APPENDIX A—RESPONSE TO PUBLIC COMMENTS

Proposed National Interim Primary Drinking Water Regulations[1] were published for comment on March 14, 1975, 40 FR 11990. Written comments on the proposed regulations were invited, and public hearings were held in Boston, Chicago, San Francisco and Washington, D.C. Almost five hundred written submissions were received, totaling several thousand pages. Seventy-seven witnesses testified at the public hearings. In all, an aggregate of over 3,500 discrete comments were contained in the written submissions and in oral testimony.

As a result of these comments and further consideration of available data by EPA, a number of changes were made in the proposed regulations. The principal changes are summarized in the preamble to the final regulations. The purpose of Appendix A is to discuss the comments received on various aspects of the proposed regulations, and to explain EPA's response to those comments.

I. DEFINITIONS

1. *"Public Water System."* More than fifty comments were directed to the definition of "public water system" contained in § 141.1. Concern was expressed over the fact that the definition does not track the statutory definition word for word. Questions were also raised concerning the coverage of specific types of facilities with their own water systems, such as parks, schools, trailer camps and factories.

The reason for expanding the statutory definition was to express more specifically the Congressional intent. The statutory definition, contained in Section 1401(4) of the Public Health Service Act ("the Act"),[2] covers all systems with at least fifteen service connections or "regularly" serving at least 25 individuals. The term "regularly" is not explained in the statute, but the legislative history of the statute makes clear that Congress intended to cover virtually all public accommodations which have their own water supply and serve at least 25 individuals. The proposed regulations therefore explained "regularly" as meaning "daily at least three months out of the year." This three-month period has been shortened to 60 days in the final regulations because campgrounds and other public accommodations serving water for as much as 60 days during the year appear to fall within the classes of facilities Congress intended to cover. If a public water system serves the requisite number of service connections or persons for a total of 60 days during a calendar year, even if the service is intermittent, it is a public water system.

It is clear from the breadth of the definition of "public water system" in the Act and from the legislative history that the coverage of the Primary Drinking Water Regulations is not limited to traditional water utilities. Campgrounds, trailer camps, factories, parks, schools, restaurants, gasoline stations, motels and other facilities which have their own water systems must comply with the regulations if they serve the requisite number of service connections or the requisite number of persons.

Proposed § 141.3, entitled "Coverage," apparently contributed to confusion over the meaning of "public water system." That section, which was taken from section 1411 of the Act, exempts from the Primary Drinking Water Regulations, public water systems which meet four specified conditions. Over

[1] The proposed regulations actually were designated "Interim Primary Drinking Water Standards." Because the Safe Drinking Water Act refers to "Regulations" rather than "Standards," the final version of the regulations does not use the term "Standards" in the title.

[2] Statutory authority for the adoption of Primary Drinking Water Regulations is derived from the Safe Drinking Water Act, Public Law 93-523, which added a new Title XIV to the Public Health Service Act. References to pertinent sections in the United States Code accordingly are to the Public Health Service Act rather than to the Safe Drinking Water Act.

50 comments were received on this section. In response to comments asking for clarification of the section, it has been revised to make clear that a public water system must meet each of the four listed conditions in order to be exempted from the regulations. Thus, a public water system is exempted only if it consists only of distribution and storage facilities and it obtains all of its water from, but is not owned or operated by, a public water system to which the regulations apply, and it does not sell water and it is not a carrier which conveys passengers in interstate commerce. Interstate carriers, therefore, are not exempted, even if they have only storage and distribution facilities, obtain all their water from a public water system, and do not sell water to the public. However, a public facility such as a hotel or restaurant is exempted if it has only storage and distribution facilities, obtains all its water from a public water system and does not sell water to the public.

Of course, many facilities serving transients obtain water by direct connection to a conventional water utility system and either do not constitute a separate system or are excluded from coverage because they meet all four of the conditions listed in § 141.3. And in some cases, such as gasoline stations, even when the facility has its own water system it often will not qualify as a public water system because it does not serve water to the requisite number of service connections or persons.

2. *"Community Water System."* Two comments requested clarification of the definition of a "community water system," § 141.2. The purpose of defining this term is to allow appropriate regulatory distinctions between public water systems which serve residents on a year-round basis and public water systems which principally serve transients or intermittent users. Different monitoring requirements are appropriate for the two types of systems, and, as discussed below, some maximum contaminant levels are not applicable to non-community systems.

The proposed regulations defined "community water system" as "a public water system which serves a population of which 70 percent or greater are residents." This definition distinguished community systems on the basis of service to residents, but it excluded a number of systems which serve a large number of residents throughout the year. For example, some large resort communities may have several hundred or even several thousand year-round residents who nevertheless make up less than 70 percent of the population of the community at any given time. Water systems in such communities should be treated as "community systems" in order to provide appropriate protection for the year-round residents in the community. Thus, the definition of a "community water system" has been revised to cover any system which serves at least 15 service connections used by year-round residents or serves at least 25 year-round residents.

A definition for "non-community system" has been added to make it clear that a public water system is categorized as being either a community or a non-community system.

3. *"Maximum contaminant level" and "contaminant."* Over 150 comments were directed to the definition of "maximum contaminant level" or the definition of "contaminant."

The definition of "contaminant" contained in § 141.2 was criticized for its breath. The term as defined includes virtually any constituent in water, including constituents considered to be harmless or even beneficial. The definition was taken directly from Section 1401(6) of the Act. It is not intended to suggest that all constituents in water are undesirable, but rather is intended to permit the regulation of any constituent which may be found to be harmful. The definition has been retained as proposed.

The definition of "maximum contaminant level" was criticized for requiring measurement of the level at the "free flowing outlet of the ultimate user of a public water system." This definition carries out the intent of Congress that "drinking water regulations are intended to be met at the consumer's tap." (H. Rep. No. 93–1185, 93rd Cong., 2nd Sess. 13 (1974)). The purpose of the Primary Drinking Water Regulations is to assure that water used by the public is safe. This can be assured only if maximum contaminant levels are met at the tap.

The final regulations retain the requirement that maximum contaminant levels be met at the consumer's tap, but have been amended to meet the point made in many comments that a public water system cannot be held responsible for contamination of water which is the fault of the consumer. It would be unreasonable to hold a public water system in violation of a maximum contaminant level if the level is exceeded at the consumer's tap as a result of the user's attachment of a faulty home treatment device, because of cross-connections in the user's plumbing system or because the plumbing is used to ground electrical systems. The definition of "maximum contaminent level" in § 141.2(d) therefore provides that "Contaminants added to the water under circumstances under the control of the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition." This wording is not meant to deter or to detract from the maintenance of a cross-connection control program by the supplier.

The proposed definition provides for measurement of turbidity at the point of entry to the distribution system, rather than at the consumer's tap, since measurement of turbidity at this point is a more meaningful indicator of the sanitary quality of the water.

4. *"Sanitary survey."* A definition of the term "sanitary survey" has been added as § 141.2(f), because sanitary surveys are referred to at several points in the final regulations. Comments from many sources, including the National Drinking Water Advisory Council, urged EPA to emphasize the importance of sanitary surveys of public water systems as a means of assuring that Primary Drinking Water Regulations will be met. The definition contained in the regulations reflects the broad extent of adequate sanitary surveys, including on-site review of the water source, facilities, equipment, operation and maintenance of a public water system.

5. *Other definitions.* Other comments were received on the definitions of "person" and "supplier of water". These defintions were taken directly from section 1401 of the Act, and have been retained in the final regulations. As in the case of some comments on the definition of "public water system," a number of these comments were based on an erroneously restricted view of the coverage of the Act. As noted above, Congress intended that Primary Drinking Water Regulations apply to a broad range of facilities with their own water systems, not just to conventional water utilities. The owner or operator of a restaurant or motel, for example, is a "supplier of water" if the facility has its own water system and serves the requisite number of service connections or persons.

II. Inorganic Chemicals

1. *General Comments.* Comments on maximum contaminant levels ("MCL's") for inorganic chemicals (§ 141.11) included questions on the analytical aspects of the MCL's—whether these were total or dissolved levels, whether the analytical methodology was adequate for the cited levels, whether an allowance had been made for analytical variations, and whether the public water system's laboratory or some other laboratory would be performing the analyses. The Administrator has verified that all of the substances for which MCL's have been specified can be measured readily by available methodology at the applicable levels. The analytical methods cited in these regulations provide information on analytical variability; and the check-sample and averaging techniques cited in § 141.23 provide additional allowances for human or mechanical errors. Two comments urged that MCL's for inorganic chemicals be deferred until issuance of the report of the National Academy of Sciences pursuant to Section 1412(e) of the Act. However, it was the intent of Congress that the Interim Primary Drinking Water Regulations be promulgated as soon as possible, so that at least minimal protection to water consumers would be available during the period that the Academy is preparing that report.

2. *Water consumption.* The MCL's for inorganic chemicals and other contaminants are based on an individual consumption rate of two liters of water per day. Fourteen comments agreed with the two-liter figure or contended that a lower figure should be used. Four comments urged the adoption of a higher consumption figure. An environmental organization submitted data indicating that some segments of the population, such as foundry workers and heavy drinkers, consume an average of susbtantially more than two liters per day.

EPA's assumption of a two liter per day water intake rate was based on evidence that the average consumption of adult males is at a rate of 1.25–1.5 liters per day and that the average consumption rate of women and children is even lower. Because Congress intended that susceptible groups in the population should be protected to the extent feasible, the use of a two-liter figure provides protection for the great majority of the population which consumes an average amount of water, or less than an average amount, or even as much as one-third more than the average amount. To base all maximum contaminant levels on the water consumption rate of the small percentage of the population which drinks much more water each day would be unrealistic and enormously expensive.

This is not to say that the maximum contaminant levels do not protect persons who drink water at a substantially higher rate than normal. As indicated below, critical maximum contaminant levels have substantial safety factors. The safety factors for persons drinking unusually large quantities of water are not as high as those for the majority of the population, but they do provide a reasonable degree of protection under the circumstances.

3. *Safety factors.* One set of comments questioned the fact that different safety fabtors are contained in various proposed maximum contaminant levels. The group commenting agreed that a uniform safety factor should not be used, but requested a more systematic discussion of safety factors at least with respect to inorganic chemicals.

The regulations are, as anticipated by Congress, based on the 1962 Public Health Service Standards, as reviewed in 1973 by the EPA Advisory Committee. The standards were not developed by a systematic approach to safety factors, at least partly because of amount of knowledge about, and the nature of the health risk of, the various contaminants covered a very broad range. The regulations are the result of experience, evaluation of the available data, and professional review.

In the Statement of Basis and Purpose for these regulations, the safety factor represented by a number of the maximum contaminant levels for inorganic chemicals was estimated. The purpose of this was to deter-

mine whether the estimated safety factor was roughly consistent with the type of information available and the nature of the health risk presented. It was not intended to rewrite the regulations on the basis of estimated safety factors.

The National Academy of Sciences has been asked to review each of the substances for which maximum contaminant levels are being set, as part of the NAS study for the adoption of Revised Primary Drinking Water Regulations. Any new information obtained by NAS on the safety factors involved will be carefully analysed by EPA.

4. *Arsenic.* Thirteen comments addressed the proposed MCL for arsenic (§ 141.11(a)). Most comments regarding arsenic recommended an MCL of 0.1 mg/l on the basis that no adverse health effects have been demonstrated from the consumption of water containing this amount.

The Administrator has considered raising the arsenic limit to 0.1 mg/l for the same reason cited in many comments—no adverse health effects have been demonstrated from consumption of water containing this amount or more, at least not in this country. However, arsenic has been shown to be a potential carcinogen in some of its forms in industrial exposures, and there appears to be a correlation between arsenic levels in drinking water and the occurrence of skin cancer in other countries. While the role of arsenic as a carcinogen or co-carcinogen has not been firmly established, it does not seem to be prudent at this time to raise the arsenic limit.

5. *Barium.* Two comments concerned the MCL for barium, and both expressed concern over required compliance when the MCL is exceeded as the result of naturally occurring barium in ground water.

Maximum contaminant levels apply equally to naturally occurring substances and those occurring as the result of man-made pollution. When barium is found to exist in a ground water source, the course of action is to attempt its removal, such as by conventional water treatment processes or ion exchange, or to obtain a different water source. If such action is not feasible, the system can seek a variance or exemption under the provisions of these and subsequent regulations.

6. *Cadmium.* Three comments suggested that the cadmium limit should be revised to allow more protection for cigarette smokers, while 49 comments emphatically denounced the concept of having non-smokers bear the financial burden of lowering the cadmium limit for the benefit of smokers. The Administrator is aware of the fact that smokers will be provided a smaller factor of safety on the basis of the cadmium limit, but he agrees with the majority that a reduction of the limit cannot be justified.

7. *Chromium.* The seven comments on the MCL for chromium included suggestions that the limit be raised, that it be eliminated, or that it be specified as only for hexavalent chromium.

The limit for chromium is based on the known toxicity of the hexavalent form. Since this form is the one most likely to be found in drinking water, and since the specified analytical detection method (atomic absorption spectrophotometry) does not distinguish between the valence states, the MCL is for total chromium. If part of the chromium present is in a lower valence state, the MCL provides an additional margin of safety.

8. *Cyanide.* There were only two comments on the MCL for cyanide—one stating that the MCL was too low and one stating that the limit was based on insufficient data. Since small amounts of cyanide do not constitute a health hazard, and since chlorination further reduces the toxicity of cyanide, this substance is rarely a problem in drinking water, and there appears to be no justification for including cyanide in the list of inorganic chemicals for which MCL's are established in these Regulations. Cyanide has not been identified during routine sampling of drinking water in concentrations greater than $\frac{1}{5}$ of the proposed MCL, which itself is $\frac{1}{100}$ of the level at which cyanide has adverse health effects on humans. It does not appear that there is justification for requiring tens of thousands of communities to monitor for this substance. Further, cyanide occurs, however rarely, in drinking water primarily as a result of spills or other accidents, which can be more appropriately controlled by other laws or regulations, such as Section 1431 of the Act. The Administrator, therefore, has decided to withdraw cyanide from the Interim Primary Drinking Water Regulations. The States may require monitoring for cyanide in appropriate circumstances.

9. *Lead.* The one comment on the MCL for lead stated that the limit is too low and that it is below or near the detection limit. The Administrator has verified that the atomic absorption spectrophotometric method specified has the necessary sensitivity for detection of the metal at the specified concentration.

10. *Fluoride.* The 94 comments on the fluoride MCL's covered an extremely broad area. Among the comments were suggestions that a single MCL of 0.05 mg/l, of 1.5mg/l, of 1.8 mg/l, of 2.0 mg/l, of 2.4 mg/l, of 2.5 mg/l, or of 5.0 mg/l be used in place of those in the regulations. There also were suggestions that different ranges be used, and that the reason for temperature-dependent MCL's be given. Some comments requested that fluoride be deleted from the regulations, or at least placed in Secondary Drinking Water Regulations. Quite a number of comments were directed toward controlled fluoridation rather than MCL's for fluoride. Some persons registered their objections to controlled fluoridation, while others requested that limits for controlled fluoridation be included in the regulations. There were comments that all fluoride should be removed from drinking water, and comments that there should be no limit on fluoride. There were comments that water supplies serving transients be excluded from the fluoride limits, and comments that educational institutions should not be excluded.

The fluoride question has been complicated by the fluoridation controversy. It was clearly the intent of Congress that Primary Drinking Water Regulations not be used as the vehicle for a national fluoridation program (House Report, p. 15). At the same time, Congress made it clear that there was no intent to prohibit or discourage fluoridation. As for changing the MCL's, either raising or lowering them, very little data were submitted to support the recommendations.

Suggestions that the MCL's be lowered were for the most part based on presumed toxicity of fluoride or on presumed increased exposure to fluoride from sources other than water. The evidence available to the Administrator indicates that the toxic effect of fluoride in drinking water is limited to mottling of dental enamel and minor changes in bone density, and that these effects occur primarily at fluoride concentrations above the proposed MCL's. It has been postulated that, with the advent of controlled fluoridation, the overall exposure of individuals to fluoride has increased to the point where the addition of more fluoride to drinking water is no longer necessary, or perhaps even to the point where lower MCL's in water ought to be established. While it is true that foods prepared in fluoridated water contribute fluoride to the diet in addition to that obtained from drinking water, it should be noted that the fluoride MCL's are based almost entirely on epidemiological evidence obtained from areas where fluoride is a natural constituent of the water. It can be assumed that in such areas most food was prepared in the local water, so the contribution of fluoride from this source was automatically taken into account;

This same epidemiological evidence showed that there is a temperature-dependent physiological effect of fluoride, both beneficial and detrimental depending on concentration. To ignore this evidence would seem to be most unwise. The use of a temperature scale for fluoride is more appropriate than for other chemicals because of the studies available on the fluoride-temperature relationship and because there is a small margin with fluoride between beneficial levels and levels with adverse health effects.

Suggestions that the MCL's be raised or eliminated were based on the interpretation of dental fluorosis as an esthetic condition rather than as a health problem or on the economic aspects of fluoride removal. The Administrator has available to him a wealth of information on the subject of fluorides, plus the advice and counsel of the dental experts at the National Institutes of Health, DHEW. On the basis of this information and counsel, the Administrator believes that the MCL's in these regulations are adequate for the protection of the health of consumers, and that there is insufficient evidence to justify altering the proposed MCL's. While the Administrator believes that the exemption of educational institutions from the fluoride limits was justified, revision of the regulations to exclude non-community public water systems from most inorganic chemical MCL's will make the exemption provision unnecessary.

11. *Mercury.* Six comments contained suggestions that the mercury limit be left as proposed except that it be applied only to methyl mercury; seven comments suggested that a limit be set for organic mercury only; and 29 comments expressed agreement with the proposed limit—a limit based on the health hazard of methyl mercury but measured as total mercury. One comment expressed dissatisfaction with mercury limits in general, on the basis that the mercury problem has been grossly exaggerated.

A specific limit for organic mercury, or designating the proposed limit as applicable only to organic mercury, both present problems in analysis, and do not provide for potential conversion of inorganic mercury to the organic form. Since the proposed limit for total mercury is based on the "worst case" concept, that is, presumes that all mercury present is in the more toxic, organic form, it provides maximum health protection. Because of the low levels of mercury found in drinking water, the economic impact of the proposed limit is expected to be minimal. The Administrator therefore is satisfied that the proposed limit for mercury is generally acceptable.

12. *Nitrate.* Most of the 21 comments on the nitrate MCL were directed toward naturally occurring nitrate and the difficulty in meeting the limit. As explained in the Statement of Basis and Purpose, nitrate can be toxic to infants. Because of the known adverse health effects of nitrate, the Administrator believes that an MCL for nitrate should be set. While it is acknowledged that removal of nitrate from drinking water is difficult, in many cases the sources of nitrate can be identified and steps taken to prevent its entry into drinking water sources. An example is the nitrate contamination of ground water as the result of surface run-off. Such contamination can often be eliminated by proper well construction.

13. *Sodium.* Several comments suggested the possibility of an MCL for sodium and the National Drinking Water Advisory Council recommended that consideration be given to

monitoring for sodium so that the public can be informed of the sodium content of available water. These concerns result from the fact that many persons in the United States suffer from diseases which are influenced by dietary sodium intake. In addition, persons may wish to limit their sodium intake for other reasons. However, EPA has not proposed an MCL for sodium, and the Advisory Council did not recommend an MCL, because the data available do not support any particular level for sodium in drinking water, and because regulation of sodium by an MCL is a relatively inflexible, very expensive means of dealing with a problem which varies greatly from person to person.

EPA has requested the National Academy of Sciences to include sodium in its study of the health effects of inorganic chemicals. In the meantime, the Agency recommends that the States institute monitoring programs for sodium, and that physicians and consumers be informed of the sodium concentration in public water systems so that they can take action they may consider appropriate.

14. *Sulfate.* Comments also were submitted urging the adoption of an MCL for sulfate. As in the case of sodium, the National Drinking Water Advisory Council recommended monitoring for sulfate levels, but did not recommend the adoption of a maximum contaminant level.

The sulfate question is similar to the sodium question in that available data do not support the establishment of any given level. A relatively high concentration of sulfate in drinking water has little or no known effect on regular users of the water, but transients using high sulfate water sometimes experience a laxative effect. Whether this effect will occur, and its severity, varies greatly with such factors as the level of sulfate in the water being consumed and the level of sulfate to which the transient is accustomed. EPA recommends that States institute monitoring programs for sulfates, and that transients be notified if the sulfate content of the water is high. Such notification should include an assessment of the possible physiological effects of consumption of the water.

The National Academy of Sciences has been asked to consider sulfate in its study. An MCL for sulfate will be proposed if it is supported by the available data.

15. *Inorganic chemical MCL's for non-community systems.* As proposed, the regulations would have made all MCL's for inorganic chemicals applicable to non-community water systems. This approach failed to take into account the fact that the proposed MCL's for inorganic chemicals, except nitrates and cyanide, were based on the potential health effects of full-time, long-term exposure. MCL's based on full-time long-term exposure are not necessary to protect transients or intermittent users served by non-community systems. Therefore, the final regulations provide that MCL's for inorganic chemicals other than nitrates are not applicable to non-community systems. Nitrates are applicable to all public water systems because they can have an adverse health effect on susceptible infants in a short period of time after exposure. (As discussed above, the other proposed inorganic chemical MCL based on short-term effects—cyanide—has been deleted.)

16. *Monitoring requirements.* Section 141.23, dealing with inorganic chemical monitoring requirements, received more comments than any other section of the proposed regulations. Altogether, there were over 300 discrete comments on inorganic chemical monitoring, with the largest segment of the comments being directed toward § 141.23 (b), the provision for increased monitoring when 75% of the maximum contaminant level is attained.

The comments on § 141.23(a) dealt mostly with the time interval allowed for compiling a historical record of water quality. Most comments contained the opinion that more time should be allowed for the "phasing in" of, particularly, the non-community water systems. On the other hand, there were comments to the effect that too much time had been allowed. There were a number of requests that non-community systems be exempted from the inorganic chemical monitoring requirements, on the basis that maximum contaminant levels are based on lifetime chronic health effects, and that users of non-community water systems are not exposed for a lifetime. There also were comments requesting that no distinction be made between different types of water systems, such as surface and ground. As noted above, because MCL's for inorganic chemicals have, in most cases, been based on chronic health effects for lifetime exposures, they will not be applied to non-community systems. Therefore, § 141.23 has been rewritten to indicate that, except for nitrates, inorganic chemicals monitoring will be required only for community water systems.

Virtually every comment on § 141.23(b) expressed criticism of the concept of increased monitoring when a contaminant level reaches 75% of the maximum allowed. Reasons given were that such monitoring imposes "a safety factor on top of a safety factor," that the State should determine when increased monitoring frequency is desirable, that analysis for some constituents would be impossible because of the limits of detection, that analytical costs would be prohibitive, that ground water contaminant levels are not variable, and that the proposed monitoring frequency was too demanding. Some commentors suggested that less frequent monitoring be allowed when a contaminant level was below 50% of the MCL.

Section 141.23(b) was written with the intent that, when a contaminant level reached 75% of the MCL, monitoring frequency would be increased so that the supplier of water would have an adequate warning of possible or impending violation of the MCL. By thus being forewarned, the supplier of water could take corrective measures before violation occurred. In light of the comments received, it has been concluded that although such sampling may be a matter of good operating practice, it is not appropriate for inclusion in a primary drinking water regulation for the reasons stated in the comments. Therefore, the Administrator has decided to withdraw § 141.23(b). However, the Administrator believes it would be prudent for the operator of a community water system to increase monitoring frequency for a contaminant which appears to be approaching the MCL, and for the States to direct such increased monitoring when appropriate.

Comments on § 141.23(c) were largely directed toward the requirement that sampling and analysis be repeated within 24 hours after determination that an MCL has been exceeded. It was felt that this did not allow enough time, and in fact there was some misunderstanding as to whether it was intended that only the resampling be completed within 24 hours or that both resampling and reanalysis be completed in this time frame. Section 141.23(c) has been rewritten to indicate that when a sample result does not comply with the MCL, the supplier of water shall initiate three additional samples within one month. Since compliance will be judged on the average of these four samples initiated over a one-month period, the requirement that the first check sample be either completed or initiated within 24 hours is not justified.

Section 141.23(d) elicited a number of comments in regard to the definition of a "moving average," and there were general objections to the public notification provision. The opinions expressed were that the public should be notified only if the violation of an MCL involved an imminent hazard to health, or that emphasis should be placed on correcting a problem rather than increasing the monitoring frequency and notifying the public. The rewording of section 141.23(c) to provide for a one-month average has eliminated the need for paragraph (d). The one-month average provides a less complicated, more efficient means of determining compliance.

In regard to public notification of noncompliance with an MCL, Section 1414(c) of the Act requires that notice of such noncompliance be conveyed to the public. The nature of the corrective measures to be taken are determined by the supplier of water and the State. The comments on § 141.23(e), the special provisions for nitrate, were directed toward the 24-hour re-analysis requirement and the concept of the special provision itself. Most comments contained the opinion that no re-analysis could be performed in the time allotted, and others questioned the basis for singling out nitrate for special consideration. Nitrate was singled out for special consideration among the inorganic chemicals because of the acute toxicity of nitrate to infants. The resampling requirement has been rewritten for improved clarity.

The comments on § 141.23(f) dealt entirely with the suggestion that alternative analytical methods be allowed. As noted above, alternative analytical techiques may be permitted by the State if the substitute method is substantially equivalent to the techniques prescribed in this regulation, in both precision and accuracy, as it relates to the determination of compliance with any maximum contaminant level.

III. Organic Chemicals

1. *CCE.* Section 141.12, maximum contaminant levels for organic chemicals, received over 80 comments. Most of these comments criticized the carbon chloroform extract (CCE) method for estimation of organic chemical contamination. Criticisms of the CCE requirement were based on cost, lack of correlation with health effects, inadequacy as a measure of total organic chemical content, inapplicability to ground water, and lack of supporting data. Some comments suggested an alternative surrogate for organic chemical contamination, including total organic carbon and chemical oxygen demand. Other comments concerning CCE were that it be considered for inclusion in the Secondary Drinking Water Regulations, that there be provision for raising the MCL when the organics content of water is shown to be harmless, and that a treatment technique be substituted for the MCL. Over twenty comments requested that the CCE procedure be dropped altogether. Three comments requested that the limit be lowered.

The general problem of organic chemicals in drinking water is accorded top priority by EPA. Concern over organic chemicals was one of the principal reasons for passage of the Safe Drinking Water Act. Surveys conducted by EPA in recent months indicate that man-made organic chemicals are present in small amounts in water supplies in many parts of the country. The Agency is committed to using the regulatory tools provided by the Act to deal with the potential adverse health effects of organic chemicals in drinking water.

The proposed use of a CCE maximum contaminant level was an attempt to deal with gross organic pollution as soon as possible pending the results of further research, sur-

veys and the NAS study. CCE was initially used as a means of taste and odor control. As concern over adverse health effects of organic chemicals grew, CCE was turned to as a rough surrogate for organics to be used as a health-based standard rather than as an esthetic standard. Unfortunately, as more is learned about organic chemical pollution of drinking water, CCE looks less and less effective as a surrogate for harmful organics.

The principal difficulty with CCE is that it includes only about one-tenth of the total organic content of the volume of water sampled and it does not measure organic compounds of greatest concern, such as the volatile halomethanes. Thus, a high CCE test result does not necessarily mean that the water tested may pose a hazard to health, and a low CCE test result may be obtained from water with a high level of potentially harmful organic compounds. In short, there is no sound basis of correlation between CCE test results and the level of harmful organic chemicals in the water tested.

To establish a maximum contaminant level under these circumstances would almost certainly do more harm than good. It could give a false sense of security to persons served by systems which are within the established level and a false sense of alarm to persons served by systems which exceed the level. It also would divert resources and attention from efforts to find more effective ways of dealing with the organic chemical problem.

Total organic carbon (TOC) and chemical oxygen demand (COD) are surrogates that have been considered, but they have limitations also. TOC has the advantage of being quicker and cheaper (on a per sample basis) than CCE, but the availability of sensitive instruments for this measurement is questionable. More investigation of the significance of any TOC number as a health effects limit is also needed. COD is easily determined with readily available laboratory equipment, but COD is not limited to organic compounds, and besides a COD number also cannot be adequately related to health significance at this time.

EPA is diverting substantial resources to research into the health effects of specific organic chemicals and groups of organic chemicals. Also, it is expected that the study of the National Academy of Sciences will produce further data on health effects. However, in view of the significance of the potential health problem, it is not enough to wait for this additional health effects data. EPA therefore will undertake to identify one or more surrogate tests for organic chemicals or organic chemical groups, and will also study in depth the presence of specific organic chemicals in drinking water supplies. It is anticipated that this effort will result in the development of an additional MCL or MCL's for organic chemicals by amendment of the Interim Primary Drinking Water Regulations without having to wait for a more complete resolution of the organic chemicals question in the Revised Regulations.

Accordingly, EPA is adopting regulations on organic chemical monitoring, using the authority of Sections 1445 and 1450 of the Act. The regulations require that over 100 selected public water systems serving substantial populations collect samples of raw and treated water for submission to EPA for organics analysis. EPA will analyze the samples for a number of general organic parameters, including CCE, TOC (volatile and nonvolatile), NVOC, Total Organic Chlorine (TOCl), ultraviolet absorbancy, and fluorescence. In addition, the water will be analyzed for 21 specific organic compounds. These laboratory analyses will be used to evaluate the extent and nature of organic chemical contamination of drinking water, to evaluate the validity of the general organic parameters as surrogates for measures of harmful organic chemicals, and to determine whether there is an adequate basis for establishing maximum contamiant levels for specific organics or groups of organics.

In addition, EPA is embarking on an intensive research program to find more definitive answers to the following four questions:

1. What are the effects of commonly occurring organic compounds on human health?

2. What analytical procedures should be used to monitor finished drinking water to assure that any primary drinking water regulations dealing with organics are met?

3. Because some of these organic compounds are formed during water treatment, what changes in treatment practices are required to minimize the formation of the compounds in treated water?

4. What treatment technology must be applied to reduce contaminant levels to the concentrations that may be specified in the regulations?

This research will involve health-effects and epidemiological studies, investigations of analytical methodology, and pilot plant and field studies of organic removal unit processes. Some phases of the research are to be completed by this fall, while much of the remainder is to be completed within the next calendar year.

As soon as sufficient information is derived from the monitoring program and related research, primary drinking water regulations will be amended so that the organic chemicals problem can be dealt with without delay. The monitoring program will be completed within one year.

During the interim period while satisfactory MCL's for organic contamination in drinking water are being developed, EPA will act in specific cases where appropriate to deal with organic contamination. If the EPA monitoring program reveals serious specific cases of contamination, EPA will work with State and local authorities to identify the source and nature of the problem and to take remedial action. EPA will also aid the States in identifying additional community water supplies that require analysis.

2. *Pesticides.* Proposed § 141.18 contained MCL's for several organic pesticides. Most of the comments on § 141.13 (out of a total of 130) requested that the MCL's for pesticides either be raised or deleted entirely. There were two requests for inclusion of limits for 2,4,5-T, one request for an organophosphate insecticide limit, one for a limit on dioxin, and requests for limits for aldrin, dieldrin, DDT and chlorine (sic.) Other comments suggested that pesticide limits be restricted to emergencies or spills, or at least only to surface water during periods of pesticide use. There were also requests for research on carcinogenic risk and bioamplification.

These proposed pesticides levels were carefully considered by the Advisory Committee and have been reviewed in light of available data on the health effects of these pesticides and their incidence in drinking water supplies. The levels established are adequately supported by the authorities cited in the Statement of Basis and Purpose.

A limit for 2,4,5-T was tentatively proposed by the Advisory Committee but was deleted from the Committee's final report in 1973 on the grounds that EPA's ban on the use of 2,4,5-T for aquatic uses made a drinking water limit unnecessary. That ban has now been in effect for about five years, and it is highly unlikely that this herbicide exists in drinking water except perhaps in extremely rare cases in trace amounts. EPA is now investigating reports of 2,4,5-T in some waterways in Northern Louisiana, and will reconsider the desirability of an MCL for 2,4,5-T if new data indicate that the pesticide is appearing in drinking water supplies at a significant rate. Dioxin is a minor contaminant of 2,4,5-T, and the same basic considerations apply to it.

The desirability of an MCL for organophosphorus insecticides, which was recommended in 1973 by the Advisory Committee, was carefully considered by EPA. It was decided not to adopt such a level, because although these pesticides would pose a serious health risk if they were present at the consumer's tap, the fact is that there is no evidence that such pesticides reach the consumer's tap. This was discussed in the preamble to the proposed primary drinking water standards, at 40 FR 11992. As noted there, these pesticides reach water sources usually only by accident or indirectly, and their tendency to degrade rapidly apparently has prevented problems which might occur when they do reach drinking water sources. The principal threat from these pesticides is from accidental spills in water sources. The appropriate way to deal with such spills is by emergency action when they occur, not by periodic monitoring which would not catch the problem in time.

With respect to aldrin, dieldrin and DDT, EPA's national survey of the presence of these pesticides in drinking water supplies has not been completed. If the results of that survey indicate that those pesticides are present in a significant number of water supplies, an appropriate amendment of the Interim Primary Drinking Water Regulations will be proposed.

The proposed MCL's for chlordane, heptachlor, and heptachlor epoxide have been deleted because EPA is currently involved in suspension and cancellation hearings for these pesticides. MCL's will be reconsidered at a later date.

Current research on pesticides, including both surveys of their incidence in water supplies and their health effects, will be continued and expanded.

3. *Monitoring Requirements.* There were over 250 comments on § 141.24, dealing with monitoring for compliance with the MCL's for CCE and pesticides. However, most of these comments were more related to the merits of the MCL's than to the monitoring requirements. The CCE limit has been discussed above, and that discussion will not be repeated here.

A number of comments on § 141.24 suggested that monitoring requirements for pesticides be eliminated, or at least that the responsibility for such monitoring be assumed by EPA or the States rather than by public water system. Concern was expressed over the cost of monitoring for pesticides, and the absence of pesticides in public water systems in some areas.

EPA agrees that regular monitoring for pesticides is not needed for all public water systems using only ground water sources. Pesticides are rarely found in significant levels in ground water. Accordingly, the proposed §141.24 has been amended to provide that for a system using only ground water, monitoring shall be required only when specified by the entity with primary enforcement responsibility. This will more reasonably limit monitoring for pesticides in systems using only ground water to those instances when the State or EPA has reason to suspect the possibility of contamination.

In the case of surface waters, the greater incidence of these pesticides requires monitoring across-the-board. For all community water systems using surface water sources for all or part of their water, monitoring for pesticides will be required within one year of the effective date of the regulations. This monitoring shall be repeated at intervals specified by the State and in no event less frequently than at three year intervals.

Section 1424 has also been amended to require that samples to be analyzed for pesticides must be collected during a period of the year designated by the entity with pri-

mary enforcement responsibility as the period when contamination by pesticides is most likely to occur. This takes into account the fact that the level of pesticides in surface waters varies on a seasonal basis in relation to agricultural uses of the pesticides. This amendment will make monitoring for pesticides in drinking water more effective.

Several comments criticized proposed § 141.24(b), which would have required increased monitoring when the contaminant level reaches 75% of the MCL. This is basically the same question addressed above with respect to monitoring requirements for inorganic chemicals. For the same reasons, the 75% increased monitoring requirement for pesticides has been eliminated.

Other comments requested that EPA allow alternative analytical procedures. A new § 141.27 has been added to provide that a supplier of water may, with State approval, employ an alternative analytical technique.

There appears to have been some misunderstanding regarding the role of the public water system laboratory versus State or other laboratories in performing analyses for the purpose of determining compliance with these regulations, and in particular the MCL's for pesticides. Although it is intended that the individual suppliers of water be responsible for the analyses, it was not intended that each supplier of water necessarily possess the analytical capability to perform the analyses himself. It is reasonable to expect each supplier of water without its own laboratory facilities will collect and transmit water samples to approved laboratories.

It should be noted that with respect to organic chemicals and other contaminants, all MCL's and monitoring requirements in these regulations are minimum requirements, and it is incumbent on the entity having primary enforcement authority to require additional monitoring and other requirements where appropriate.

IV. Turbidity

1. *Turbidity MCL's.* About half of the more than 160 comments on the MCL for turbidity (§ 141.14) contained a request that turbidity be deleted from the Primary Drinking Water Regulations or be relegated to the Secondary Drinking Water Regulations. There were also requests that the MCL be raised, that there be a limit of 5 turbidity units ("TU") and a "goal" of 1 TU, and that the MCL be lowered. Other comments referred to turbidity in sub-arctic waters, the use of a two-level MCL for turbidity, and the apparent encouragement of chlorination.

The Administrator has determined that turbidity is indeed appropriately classified as a health limit, in that turbidity has a marked effect on the bacteriological quality of water, whether or not disinfection is practiced.

As noted above, many comments questioned the need for a turbidity limit applicable to systems using only a ground water source. In this regard the Administrator believes that in most cases, turbidity is not a problem in properly developed wells. In some cases, excess sand is included in the water pumped but this is not a health related problem. In other cases dissolved iron present precipitates upon oxidation. This also is not a health related problem. In some fractured geologic formations and particularly in limestone formations, turbidity could be a periodic problem because of a short retention times in the aquifer. In these cases the State is encouraged to take appropriate action in establishing a limit or treatment requirement.

Some comments questioned the proposal to allow an MCL of 5 TU rather than 1 TU in cases where the entity with primary enforcement responsibility specifically authorized the higher MCL. The Administrator believes this is justified on the basis that not all turbidity is related to bacteriological quality. Examples of instances where the higher turbidity may be allowed are when iron or other minerals, or minute ice crystals in otherwise satisfactory water, are the cause of the turbidity. Proving that a particular type of turbidity does not interfere with disinfection or does not interfere with microbiological determinations is not always easy. One of the best methods for proving the former is an accumulation of data showing good bacteriological quality in the distribution system over an extended period of time, even with turbidity over 1 TU. A microbiologist can, by various manipulative techniques, tell whether or not turbidity is interfering with the coliform test. No doubt a State may employ other means for determining when a public water system has qualified for the higher turbidity limit.

The proposed regulations measured the turbidity MCL only on the basis of a monthly average. The National Drinking Water Advisory Council recommended that a supplementary MCL be established to protect against the appearance of a particularly high turbidity level over a short period of time. In accordance with the Council's recommendation, § 141.13 has been amended to establish an MCL of 5 TU as an average of two consecutive daily samples. EPA agrees with the Council that turbidity levels above 5 TU cannot be justified in surface waters for more than a one-day period.

That there is an implied endorsement of chlorination in these regulations cannot be denied. The Administrator, recognizing chlorination as being the only generally available disinfectant in water treatment, has on several occasions specifically endorsed chlorination as a valuable public health measure. Pending further research, the possible long-term adverse effects of chlorination are in most cases offset by the effectiveness of chlorination for preventing bacteriological contamination.

2. *Turbidity Monitoring.* There were over 120 comments on the turbidity monitoring requirements (§ 141.22). Most of the comments were directed toward the requirements as they applied to water supplies using water from underground sources. It was agreed that turbidity in ground water need not be monitored, and in fact there were a number of comments suggesting that turbidity monitoring be deleted altogether. There were comments that the sampling was too frequent, and comments that in some circumstances the sampling was too infrequent. The question of cost was brought up in connection with sampling frequency. There also were requests for clarification of the entire section, with particular emphasis on defining an "entry point" to a distribution system.

It was the intent of the Administrator that public non-community water systems using ground water be exempted from the turbidity monitoring provisions. Unfortunately, however, the omission of commas in § 141.22(c) made it appear that only community systems using ground water were required to monitor for turbidity. The section has been written so that the turbidity monitoring requirements apply only to water systems using surface water sources. Also, for non-community systems using surface water, the regulations have been modified to require that the turbidity monitoring must be initiated within 2 years of the effective date.

The measurement of turbidity at the entry point to the distribution system, rather than at the consumer's tap, can be justified on at least two bases. First, since turbidity can be controlled only by water treatment processes, it is most appropriately measured immediately after the water has been treated, and before the measurement is affected by scale, sediment or other materials present in pipelines. Second, since one of the principal purposes for limiting turbidity is the fact that turbidity interferes with disinfection, and since disinfection is effected at the treatment plant, turbidity at the consumer's tap is not an adequate reflection of conditions where disinfection is taking place.

Comments suggesting an increased sampling frequency for turbidity in effect were suggesting operational monitoring desirable in specific cases rather than a frequency which is practical when generally applied to thousands of public water systems. It should be reiterated that these regulations contain only minimum requirements, and that more frequent monitoring can be required by EPA or the States in apppropriate cases. Furthermore, there is nothing in these regulations to deter a supplier of water from more frequent turbidity monitoring as an operational guide.

Other comments on turbidity monitoring stated that the proposed requirements were too expensive. However, the cost and effort involved in measuring turbidity are not excessive. This is one parameter which can be, and in fact must be, measured by the individual suppliers of water. Almost anyone can learn to take turbidity measurements, and only a few seconds are required for each measurement. The only cost is in the purchase of a turbidimeter, which lasts for many years.

In order to take into account the fact that turbidity measurements in most cases will not be taken by trained laboratory technicians and that erroneous high readings can be obtained by careless handling of the test, § 141.22(b) has been amended to provide that if the initial daily sample appears to exceed the maximum allowable limit but a repeat sample shows a lower turbidity, the results of the repeat sample shall be used rather than the results of the initial sample.

Because turbidity is closely interrelated with filtration and disinfection, sampling is to be done at "a representative entry point(s) to the water distribution system." This means at a point between the filters and the mains. A clear well would be appropriate, as would be a point between a pump discharge and the mains if there are no filters. In the event that there are several "entry points," such as would be the case when there are several well pumps, a sampling point common to all pump discharges would obviate the necessity to sample at each pump discharge. If there is a question as to whether or not a particular sampling point were "representative" of the water being delivered to the distribution system, the State would make the decision. Alternative analytical procedures, such as continuous turbidity monitors, may be used at the discretion of the State.

V. Microbiological Limits

1. *Coliform Limits and Standard Plate Count.* There were almost 140 comments on § 141.15, Maximum Microbiological Contaminant Levels, of which about half were directed toward § 141.15(b), the standard plant count ("SPC"). Most of the comments on § 141.15(a), coliform limits, were general in nature, covering such points as clarification of the language, use of alternative indicator organisms, raising or lowering the limits, averaging of results, and the assignment of responsibility for performing the tests. Nearly all the comments on the SPC expressed opposition to the imposition of a maximum contaminant level. Opposition was based on the lack of health significance of the SPC and the unfavorable cost-benefit ratio.

Section 141.15(a) has been rewritten for clarification. The Administrator believes the coliform group of organisms are the best indicators of bacteriological quality of drinking water, although of course research into possible alternative indicators is ongoing. The Administrator also believes the maximum contaminant levels for coliform organisms are adequate to protect the health of consumers. Other limits for bacteriological quality, such as those in the World Health Organization Drinking Water Standards, may appear to be more stringent and thus more protective of health, but it must be remembered that WHO Standards are merely guidelines, not enforceable regulations. It should also be remembered that the currently proposed regulations contain minimum standards of quality, and that lower levels of contaminants should be attained when feasible. Because of the effect a single sample may have on a monthly average, particularly when only a few samples are examined per month, quarterly averaging will be allowed for those public water systems serving populations of 3300 or less.

Although the Administrator has evidence that the Standard Plate Count does have health significance, and in addition is a valid indicator of bacteriological quality of drinking water, the Administrator has deleted § 141.15(b). Because the coliform limit provides adequate protection against microbiological contamination, the cost of an SPC requirement cannot be justified. However the Administrator recommends that the SPC measurement be applied judiciously wherever indicated, if only as an operational tool, in conjunction with the coliform test.

2. *Chlorine Residual Substitution.* There were over 170 comments on § 141.16, the chlorine residual substitution provision. The comments represented overwhelming opposition to total substitution with concomitant suspension of the coliform test. There were also comments on the analytical procedure, free chlorine residual versus combined residual, and particular opposition to the concept of allowing substitution in the smaller communities. In the latter case, it was stated that a small community would not have a water system operator of sufficient skill or dedication to monitor chlorine residuals accurately or faithfully. There were several questions regarding the different chlorine residuals specified in §§ 141.16(a) and 141.16 (b). Some believed the residual should be raised, while others believed the lower residuals should be permitted.

The chlorine residual substitution provision was inserted so that in those communities where chlorination is practiced, some economic benefits might be realized by the deletion of part of the coliform testing requirements without affecting the health protection provided. In the smallest communities, total substitution of chlorine residual testing would result in a significant economic benefit, since it is in these communities that the maintenance of adequate water quality has the highest per capita cost. The Administrator believed that the maintenance of an adequate chlorine residual in a distribution system throughout a month was at least equivalent, in health safety terms, to isolated coliform tests. In the event that total substitution had been allowed by the State, the slightly higher chlorine residual provided a greater factor of safety.

It is true that a chlorine residual alone does not guarantee the absence of pathogenic bacteria. It is also true that a negative coliform test does not always guarantee the absence of pathogenic bacteria. However, the Administrator concedes that, because of questionable reliance on unskilled operators in the smallest communities, it would not be prudent to permit 100% substitution of chlorine residual testing for coliform tests in those cases. For this reason, proposed § 141.16(b) has been deleted. However, 75% substitution will be permitted where specifically authorized by the entity with primary enforcement authority.

The analytical method specified for chlorine residual testing led to some misunderstanding. The DPD method, as described in "Standard Methods of Examination of Water and Wastewater," appears to be an involved and sophisticated procedure. It was specified primarily on the basis of accuracy and sensitivity, particularly when compared with the o-tolidine procedure in common use. The latter has been shown to be inaccurate and unreliable, but remains popular because of its simplicity and the ready availability of field test kits. What is not known, apparently, is that the DPD test is almost as simple and is also available in reasonably priced field test kits.

Chlorine substitution has been specified, rather than "disinfection substitution," simply because there is no other disinfection procedure of comparable safety and reliability. Iodination has been suggested, but iodine presents a health risk to some persons.

3. *Microbiological Monitoring.* There were over 250 comments on § 141.21, microbiological contaminant monitoring requirements, of which over 70 comments were directed toward § 141.21(g), the standard plate count monitoring requirement. Although both increased and decreased sampling frequencies for coliforms were requested, by far the greater number of comments expressed the opinion that the requirements of this section were unreasonably burdensome, particularly for the smaller communities and non-community public water systems. There were also numerous requests for clarification or modification of the coliform monitoring requirements, such as requests to modify the time for resampling, requests to permit exclusion of sampling points which have been shown to be contaminated, and requests to permit discarding positive bacteriological sampling results for which the check sample results are negative. In regard to § 141.21(g), the standard plate count monitoring requirement, most comments reflected the objections to the parameter itself rather than objections to the frequency of monitoring.

Considerable attention has been given to the sanitary surveys and monitoring frequency for coliforms, particularly in the case of small community systems or non-community systems. The concept of a sanitary survey, expressed in a number of comments, can be considered as a factor in determining the sampling frequency for a particular system. The practicality of sanitary surveys, at annual or even less frequent intervals, versus the collection and analysis of two water samples per month, must be carefully considered on both economic and manpower requirements. It has been estimated that there are 200,00 non-community water systems in this country, but from the information supplied in the comments received it is evident that this number may be too conservative. An adequate sanitary survey of each of these systems in one year would create a severe strain on the skilled manpower necessary.

The consensus of opinion from the States is that, in the event a sanitary survey becomes acceptable for establishing coliform sampling frequency for any segment of public water systems, a priority scheduling of surveys will be established, with populations at risk and known trouble spots being factors to consider. With such priorities, it is evident that the non-community systems, serving small population groups and delivering water on which there is no past record, will be last to receive attention. For this reason, among others, the paragraph on coliform monitoring, § 141.21(a), has been re-written to establish a minimum sampling frequency of one per calendar quarter for non-community systems. A sanitary survey can be used as a basis for modifying the sampling frequency. For the smaller community public water systems, a new population range has been delineated, with an accompanying reduction in coliform sampling frequency. In this range (25–1,000 persons served) one sample per month is the minimum, although the State may, based on a sanitary survey verifying certain conditions, reduce the sampling frequency, except that in no case shall it be reduced to less than one per quarter. In addition, the paragraph has been re-written to clarify the intent and to spell out more precisely the means by which compliance or non-compliance is determined.

An effort has also been made to clarify the samples that should be included and excluded among those used to calculate compliance. In this regard, a paragraph has been added on "special purpose samples", to define those used to check such operations as pipe disinfection procedures.

For non-community systems, in order to ease the laboratory work load, and provide a phased approach, the bacteriological monitoring requirement must be implemented within 2 years after the effective date of the regulations. This provides a 2 year period for the suppliers, State agencies, and laboratories to prepare for the greatly increased number of samples to be analyzed.

In response to the request to permit the elimination from future sampling of those points that have a history of questionable water quality, the wording has been modified to state that any sampling point at which check samples have been required may not be eliminated from future sampling without approval of the State.

Concern has been expressed that in some cases, because of either a sampling or a laboratory error, a microbiological analysis could result in an erroneously large count. The regulations require that this result be included among those samples used in calculating the average monthly coliform bacteria density, even though the subsequent check samples may have been all negative. This high count could cause the supplier to fail the monthly average and thus require that he notify the public.

The Administrator understands this problem, but cannot agree that the one "bad" sample should not be included in calculating the average. The reason is that there is no way to confirm that the bacteriological result of a sample collected in the past was due to sampling or analytical error. It cannot be accomplished, for example, by collecting a check sample, which by the length of the standard test, would have to be collected at least one day after the original sample. The check sample would not necessarily reflect the bacterial situation of the previous day. The only way to confirm bacterial sampling results are to collect and analyze samples in duplicate or triplicate.

Since there is no provision for discarding or adjusting for occasional spurious results from sampling or analytical error, EPA recommends that for positive bacterial analyses standard analytical verification methods be used to verify analytically that coliform bacteria are present.

As stated earlier, the standard plate count requirement has been deleted, although it is recommended that the parameter be employed as conditions warrant.

VI. Laboratory Certification

There were over 100 comments on § 141.27 dealing with laboratory certification. In general, there was agreement with the con-

cept of laboratory certification, although there were a few requests for clarification of the role of the certifying authority. Most of the comments contained objections to the concept of requiring turbidity and chlorine residual tests to be performed by certified laboratories. The remaining comments addressed the cost of certification, the need for time to get labs certified, and the scarcity of qualified laboratories.

It was the intent of the Administrator that EPA would certify at least one laboratory in each State with other laboratories to be certified by the State laboratory or laboratories qualified to perform this function. Because of the transient nature of turbidity and chlorine residual values, it is not possible for a public water system to collect samples and transmit them to a central laboratory for determination of these parameters. It was the intent of the Administrator that the individual operators of public water systems perform their own turbidity and chlorine residual analyses. It would seem advisable, however, that such operators be certified, approved, or at least minimally trained to perform the analytical tasks before a State could accept their analytical determinations as having enough validity for decisions regarding compliance or noncompliance to be made.

VII. Reporting and Public Notification

1. *Reporting.* There were over 300 comments on § 141.31, dealing with reporting requirements, but only three basic criticisms; the reporting requirement should be limited to those situations which are essential to enforcement of the regulations; the section needs clarification; and the institution of reporting requirements makes compliance with the regulations either difficult or impossible. Minor comments included requests for changes in the 36-hour and 40-day reporting requirements, requests for a corrective action requirement rather than a reporting requirement, and requests that Federal agencies report to the States rather than to EPA.

Section 1413 of the Public Health Service Act deals with the role of the States in implementing and enforcing drinking water regulations. Section 1414 of the Act spells out actions to be taken if a State fails to assure enforcement of drinking water regulations. A State could not effectively comply with the provisions of these sections without receiving regular reports from every public water system within its jurisdiction. Monitoring frequencies have been established, and if only violations of maximum contaminant levels were reported the State would not know whether or not monitoring frequencies had been adhered to. Thus all activities of a supplier of water in connection with these regulations are essential to enforcement of the regulations and must be reported to the State.

It is apparent from Section 1447 of the Public Health Service Act and the legislative history of the Safe Drinking Water Act that Federal agencies are to be treated exactly like any other owner or operator of a public water system, except in cases involving national security. Therefore, the Administrator believes that it would be contrary to the intent of the Act to require Federal agencies to report only to EPA and not to States with primary enforcement responsibility. In the revision of § 141.31 of these regulations, no exemption for Federal agencies from the provisions of the regulations will be specified.

2. *Public Notification.* Section 141.32, the public notification provision, received a large number of comments. Of the more than 300 comments, only two approved of this section as written. Two additional comments contained suggestions for modification, such as, for example, to require a second notice to tell the public that the condition previously reported had now been corrected. Every other comment expressed opposition to public notification, either on the basis of disagreement with the concept, on the basis of inappropriateness for some types of water systems, or on the basis of some type of inequity. Most frequently heard comments were: the State should have the authority to notify consumers only if there is an immediate and significant threat to public health; scare tactics will lead to public disregard; notification by radio and TV within 36 hours is an unreasonable requirement; notification of the entire public is unreasonable when only a portion of the public is involved; and notification by means of water bills is unacceptable. One of the more constructive comments was that, while the concept of public notification was opposed, the supplier of water should be given the opportunity to explain the deficiency.

To explain the intent of Congress in requiring public notification, the following is quoted from House Report No. 93–1185:

"The purpose of this notice requirement is to educate the public as to the extent to which public water systems serving them are performing inadequately in light of the objectives and requirements of this bill. Such public education is deemed essential by the Committee in order to develop public awareness of the problems facing public water systems, to encourage a willingness to support greater expenditure at all levels of government to assist in solving these problems, and to advise the public of potential or actual health hazards."

The Administrator agrees that the supplier should be given the opportunity to explain the deficiency. It was not the intent of Congress, that such notices would be merely a flat statement that the water system had failed to meet the requirements of the Regulations. To quote the House Report further:

"the Committee expects that the Administrator's regulations would permit public water systems to give fair explanation of the significance or seriousness for the public health of any violation, failure, exemption or variance. These regulations should also permit fair explanation of steps taken by the system to correct any problem."

The wording has therefore been modified to permit that the supplier may use the notice to explain the significance or seriousness of the violation, to include the results of additional (subsequent) sampling, and to indicate preventative measures that should be taken by the public.

As to the unreasonableness of allowing only 36 hours prior to radio and TV notification, this wording has been modified to read 48 hours and the Administrator believes that this is adequate time to prepare such notification when an MCL is violated.

Time requirements for notification in newspapers has been established. The regulations require that the failure of any MCL shall be published in a daily newspaper or newspapers of general circulation in the area served by the system, on not less than three consecutive days, and that such notification is to be completed within seven days after the supplier learns of the failure. The notice shall be provided to radio and television stations within 48 hours after he learns of the failure.

Public notice for other failures of the regulations, such as failure to comply with testing procedures, failure to comply with monitoring requirements, and failure to comply with a schedule prescribed pursuant to a variance or exemption, is to be made by including a notice with the water bills, within at least three months after the supplier learns of the failure. In the event water bills are not issued, there is a provision for using another form of direct mail.

The provision for mailing notices responds at least in part to the comment that the notice should not be made to the entire public but only to the portion of the public using the water. Otherwise, it is true that a notice given in a newspaper of general distribution, or a radio or television broadcast, will reach more people than those affected by a particular public water system.

There is no way that this can be avoided, but there is nothing in the regulations which would prevent the notice from specifying which person or which area need be concerned about the notice.

The Administrator agrees that the proposed public notice provisions are inappropriate for non-community water systems. Notices in the local media and in water bills will not have the intended effect with these systems serving transients or intermittent users. Therefore, § 141.32 has been revised to include a provision for other types of notification, subject to approval by the State, for non-community water systems. Envisioned here are such types of notification as a poster or sign near the drinking fountain of a facility serving the travelling public, or a handbill distributed to factory workers.

VIII. Economic Considerations

There were over 100 comments on the economic aspects of the regulations. The two most frequent comments were that the estimates in the preamble were much too low, and that the economic impact on the smaller water utilities would be severe. The corrective measure suggested in most cases was that EPA should give grants to the public water systems or should provide funds to the States to pay for monitoring. In general, the comments contained criticisms of the regulations in that they were termed "not cost effective."

It was the intent of Congress that the bulk of the costs associated with the Safe Drinking Water Act would be borne by the individual public water systems and thus the consumers. Of all the comments on the cost of a program to improve the quality of drinking water, it is noteworthy that only one comment stressed the benefits to those consumers.

There is no doubt that money will be spent for increased monitoring. This is particularly true for the smaller water systems, where in the past practically no monitoring has been performed. These very small water systems are the ones which most need improvement, so it can be expected that the costs will be proportionately higher for the small systems when compared with larger systems. On a per capita basis, since so few customers are involved, the costs will be disproportionately higher for the smaller systems. Congress did not intend that the monitoring costs for these systems would be subsidized. Rather, Congress hoped that many small systems would be consolidated into larger systems, so that the costs would be shared by a larger number of consumers, and so that improved drinking water quality would more easily be attained.

A cost and economic analysis of the monitoring requirements are attached as Appendix B.

IX. Other Comments

1. *Siting.* Of the more than 70 comments on § 141.41, siting requirements, most either wanted the section deleted or else clarified in some way. The criticisms were that the requirements for siting were not realistic, that the terms used needed definitions, that State

approval be granted before a change in a water system be made, or that State approval is already required in the circumstances. The limitation regarding the "100-year flood" was criticized on the basis that water intakes (for surface water sources) must be in the floodplain. Suggsetions included: use the words "geological hazards and man-made disasters;" add the phrase "avoid causing adverse environmental impacts;" and limit the provisions to "ground level or underground storage facilities, vertical wells of a system which has no filtration or any other treatment facilities."

It should be pointed out that the section on siting requirements in these regulations is flexible, in that the phrase "to the extent practicable" allows considerable leeway. These minimum siting requirements were included on the basis of section 1401 (1) (D) of the Public Health Service Act, which states: "The term 'primary drinking water regulation' means a regulation which contains • • • requirements as to (ii) siting for new facilities for public water systems." Obviously, some clarification of even these minimal requirements is called for, so the section has been revised. In accordance with Congressional intent, the revised version makes clear that all final siting decisions are to be made at the State and local government level.

2. *Effective date.* There were only three comments on § 141.51, the effective date of these regulations. All of these comments contained the request that more time be allowed for water systems, particularly those of small communities, to come into compliance.

The effective date of these regulations was established by section 141.12(a)(3) of the Public Health Service Act, which provides that, "The interim primary regulations first promulgated under paragraph (1) shall take effect eighteen months after the date of their promulgation." The Administrator believes that, by scheduling the monitoring requirements in several phases, ample consideration has been given to small systems. Variances and exemptions will be available in appropriate cases.

3. *Radionuclides.* There were approximately 50 comments relating to maximum contaminant levels for radionuclides. However, EPA only proposed MCL's for radionuclides on August 14, 1975, 40 FR 34324. Comments on radionuclides will be taken into account in that rulemaking proceeding.

4. *Water treatment chemicals.* Ten comments addressed chemical requirements in connection with the proposed regulations. The comments stated that certain chemicals, particularly activated carbon and filter grade alum, are in short supply.

It is acknowledged that an increase in the extent of water treatment will cause an increased demand for water treatment chemicals. If a particular treatment technique were to be specified, the demand for any chemical involved in that treatment technique could increase dramatically. Since no treatment in lieu of a monitoring requirement was specified in these regulations, the problem has not surfaced as yet. Before specifying any treatment technique, the Administrator will investigate both the availability of the necessary chemicals and the costs associated with that treatment technique. Naturally, the effect of an increased demand for a particular chemical on the cost of that chemical will also be investigated. Because of the phasing of the provisions of the Safe Drinking Water Act, and because there is currently no shortage of raw materials for the production of water treatment chemicals, it can be expected that ample quantities of these chemicals will be available for conventional water treatment when they are needed.

5. *Treatment techniques.* On the subject of treatment techniques or treatment technology, 30 comments contained criticisms or suggestions. It was noted that no treatment techniques were specified in lieu of MCL's, and almost unanimous support for this approach was expressed. On the other hand, it was suggested that information on treatment technology to remove certain contaminants be supplied.

While no treatment technique requirement was included in these regulations, the Administrator may specify such techniques in revised regulations if warranted. The Administrator believes, however, that it is always preferable to specify monitoring requirements if at all possible, because of the uncertainties involved in a treatment technique. Although a treatment technique may appear to be capable of removing a particular contaminant, based on laboratory or pilot plant studies, in actual water plant operation such removal may not always occur. Without monitoring, the adequacy of the treatment technique cannot be ascertained. As for technology for the operation of a conventional water treatment plant, operation and maintenance regulations are to be published separately. Techniques to be used for the removal of specific contaminants are the subject of ongoing research.

6. *Miscellaneous.* Comments not classified elsewhere addressed a number of miscellaneous topics, including the following: typographical errors, regulations for the quality of intake water, control of pollutants at the source rather than in drinking water, training of water plant operators and the encouragement of young people to enter the water treatment field, control of watersheds as a means for improving the drinking water quality, amending the regulations to eliminate systems serving less than 200 people, setting of priorities according to size and type of system when applying the regulations, regulations for interconnections of supplies, provision of technical support by the Environmental Protection Agency Regional Offices, and the development of a policy on carcinogens as an aid to standard setting.

APPENDIX B—COST AND ECONOMIC ANALYSIS EXECUTIVE SUMMARY [1]

1.0 *Safe Drinking Water Act of 1974.* The objective of the Safe Dranking Water Act (Pub. L. 93–523) is to establish standards which will provide for safe drinking water supplies throughout the United States. To achieve this objective the Congress authorized the Environmental Protection Agency to establish national drinking water regulations. In addition, the Act provides a mechanism for the individual States to assume the primary responsibility for enforcing the regulations, providing general supervisory aid to the public water systems, and inspecting public water supplies.

The purpose of the legislation is to assure that water supply systems serving the public meet minimum national standards for the protection of public health. Prior to passage of the Act, the Environmental Protection Agency was authorized to prescribe Federal drinking water standards applicable only to water supplies used by interstate carriers. Furthermore, these standards could only be enforced with respect to contaminants capable of causing communicable diseases. In contrast, the Safe Drinking Water Act authorized the Environmental Protection Agency to establish regulations to (1) protect public water systems from all harmful contaminants; (2) protect underground sources of drinking water; and (3) promote a joint Federal-State system for assuring compliance with these regulations.

1.1 *National interim primary drinking water regulations.* The EPA published its Proposed National Interim Primary Drinking Water Regulations in the FEDERAL REGISTER, March 14, 1975. The EPA held four public hearings and received several thousand pages of public comments on the proposed regulations. Based upon its review of the comments, the EPA revised the proposed regulations for final publication. The major provisions of the Interim Primary Drinking Water Regulations are:

1. Maximum contaminant levels for certain chemical, biological, and physical contaminants are established;

2. Monitoring frequencies to determine that contaminant levels assure compliance are established; and

3. A methodology to notify consumers of variances, exemptions, and non-compliance with standards is set forth.

1.2 *The Water Supply Industry.*

1.2.1 *Public Water Systems.* The Safe Drinking Water Act of 1974 covers public water systems that regularly serve an average of 25 people or have at a minimum 15 service connections. Systems that serve the travelling public are considered public water systems under the Act. EPA currently estimates there are 240,000 public water systems that will be subject to the regulatory requirements developed under the Act.

The Interim Primary Drinking Water Regulations categorize public systems as community and non-community systems. A community system is defined as a public system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. The non-community system category includes those systems which serve a transient population. At the present time the distribution between the two classes of public systems is estimated as follows:

Community systems	40,000
Non-community systems	200,000
Total	240,000

Based on the data contained in the ongoing EPA public water supply inventory, there are approximately 177 million persons served by community water systems. Table 1–1 shows the distribution of community systems by population served. Most of the community water systems are small in size. Over 90 percent of the nation's supplies are in the under 10,000 persons served category but they provide water to less than 25 percent of the total population served by community systems.

While all public systems do not treat all of the water they supply to their customers, they do employ a variety of treatment processes. The current EPA Inventory of Public Water Supplies indicates that the most prevalent treatment processes are used to control bacteriological contamination and turbidity. The percentage of systems employing the various treatment processes is presented in Table 1–2.

[1] This summary is based on a detailed and comprehensive study prepared for EPA by Energy Resources Company of Cambridge, Massachusetts, titled, "Economic Evaluation of the Interim Primary Drinking Water Regulations" (October 1975).

TABLE 1-1.—*Distribution of community water systems*

System size (persons served)	Number of water systems	Total population served (in thousands)	Percent of total population served
25 to 99	7,008	420	0.2
100 to 9,999	30,150	36,816	20.8
10,000 to 99,999	2,500	61,423	34.6
100,000 and over	243	78,800	44.4
Total	40,000	177,450	100.0

Source: EPA Inventory of Public Water Supplies (July 1975).

TABLE 1-2.—TREATMENT PROCESSES EMPLOYED BY COMMUNITY WATER SYSTEMS

Treatment:	*Percent* [1]
Aeration	6.6
Prechlorination	7.8
Coagulation	11.3
Sedimenation	8.9
Filtration	12.8
Softening	4.9
Taste and odor control	3.4
Iron removal	5.7
Ammoniation	0.9
Fluoride adjustment	8.5
Disinfection	35.2

[1] Percentages do not total 100 percent since many systems have multiple treatments, or no treatment.

Source: EPA Inventory of Public Water Supplies (July 1975).

Community water systems may be publicly or privately owned. The majority, 58 percent, of the 40,000 community water supplies are publicly owned and these systems supply 88 percent of the total drinking water production.

As indicated earlier, it is estimated that there are approximately 200,000 public non-community water systems. Most of these systems are privately owned. Non-community systems are found at service stations, motels, restaurants, rest areas, camp grounds, State parks, beaches, national parks, national forests, dams, reservoirs, and other locations frequented by the travelling public. Some schools and industries are also included in this category. Data on these systems are very sparse, and only rough cost estimates can be made.

The portion of the water supply industry considered here includes only those systems which primarily supply water for residential, commercial, industrial and municipal use. An approximate allocation of water use by various categories of users is shown in Table 1-3. As might be expected most of the water delivered, 63 percent, is for residential purposes. The second largest use, industrial, consumes 21 percent.

TABLE 1-3.—COMMUNITY WATER SUPPLY USE BY CATEGORY

Type of use:	*Percentage of total*
Residential	63
Commercial	11
Industrial	21
Municipal	5
Total	100

Source: U.S. Geological Survey Data (1972)

1.3 *Costs to meet the interim primary drinking water regulations.*

1.3.1 *Monitoring costs.* The implementation of the Interim Primary Drinking Water Regulations will require all public water systems to initiate a monitoring program to determine that the maximum contaminant level requirements of the regulations are not exceeded in finished drinking water. The costs associated with this monitoring activity are a function of system size, water source, and classification (community vs. non-community).

There are two classes of monitoring costs, routine monitoring costs and non-compliance monitoring costs, imposed by the interim regulations. Routine monitoring costs are those incurred in meeting the sampling requirements of the Interim Primary Drinking Water Regulations, to determine compliance with the regulations. Non-compliance monitoring costs are those which are incurred when additional sampling must be made if routine monitoring results indicate that a system is not in compliance with one or more maximum contaminant limit.

The Interim Primary Drinking Water Regulations call for the monitoring of four classes of contamination: inorganic, organic, microbiological, and turbidity. The routine monitoring frequencies for community and non-community systems are shown in Tables 1-4 and 1-5.

TABLE 1-4.—*Monitoring requirements: Community supplies; interim primary drinking water regulations*

Component	System type	Deadline for initial sampling after effective date	Testing frequency
Coliform	Ground and surface	1 mo	Monthly.[1]
Inorganic chemicals	Surface	1 yr	Annually.
	Ground	2 yr	Every 3 yr.
Organic chemicals	Surface	1 yr	(3).
	Ground	As specified by the State	As specified by the State.
Turbidity	Surface	1 d	Daily.

[1] Supplies must collect minimum required samples during each month after effective date. The number of samples varies with the system size from 1 to 500 samples per month.
The State may reduce the sampling frequency based on a sanitary survey of a system that serves less than 1,000 persons from a groundwater source, except that in no case shall it be reduced to less than one per quarter.
[3] The analyses shall be repeated at intervals specified by the State but in no event less frequentlythan at 3-yr intervals.

TABLE 1–5.—*Monitoring requirements: Noncommunity supplies; interim primary drinking water regulations*

Component	System type	Deadline for initial sampling after effective date	Testing frequency
Coliform	Surface and ground	2 yr	Quarterly.[1]
Inorganic chemicals—nitrates only.	Surface and ground	do	Determined by the State.
Turbidity	Surface	do	Daily.

[1] May be modified by the State based on sanitary survey.

In developing routine monitoring costs, the number of systems requiring routine monitoring is fixed by the number of ground and surface water supply systems in each discrete size range and the monitoring frequency prescribed by the regulations. Therefore, the only variable in the cost equation is the price per analysis. This price will depend on the institutional arrangements made by each system for analytical services. At the present time some water supplies perform their own analyses, while others depend on State health agencies or private commercial laboratories. The unit analytical costs developed for the monitoring costs estimates are as follows:

Analysis:	*Cost range*
Coliform	$5–10
Complete inorganic	70–170
Complete organic	150–260

The lower costs are based on costs incurred in EPA laboratories while the higher costs are based on commercial laboratory estimates.

In developing non-compliance monitoring costs, the critical variable is the number of additional samples required when a system exceeds a maximum contaminant level (MCL). The interim regulations require a minimum of two check samples when the coliform MCL is exceeded and at least three repeat samples when an inorganic or organic MCL is exceeded. In each instance the supplier must continue the sampling procedure until two consecutive samples show that the MCL is not exceeded. For coliform violations it is expected that from 2 to 5 special analyses may be needed. For organic and inorganic violations it is expected that from 3 to 6 special analyses may be necessary.

The estimated costs for routine and special monitoring for public water systems are summarized in Table 1–6. In the first year of implementation the annual costs are expected to fall in a range of $14 million to $30 million. By the end of the third year when the non-community systems begin to monitor, the annual monitoring costs will rise to a range of $17 million to $36 million. These monitoring cost estimates do not reflect the costs of existing monitoring programs. Current routine monitoring is estimated at approximately $10 million to $17 million annually.

TABLE 1–6.—*Total monitoring costs mandated by the interim primary drinking water regulations*

[In millions of dollars]

	1st year	2d year	3d year
Cost of routine monitoring for the 40,000 community systems[1]	13.30–27.3	12.70–26.3	12.3–25.5
Monitoring due to violations of MCL for 40,000 community systems:			
(i) Coliform violation monitoring	.50– 2.0		
(ii) Inorganic violation monitoring	.01– .3	.01– 0.3	
Routine monitoring costs for 200,000 public systems[1]			4.5– 9.4
Monitoring due to violations of MCL for 200,000 public systems[2]			.3– .8
Total	14.00–30.0	13.00–27.0	17.0–36.0

[1] Annual costs beginning the 1st year after implementation of the regulations.
[2] Annual costs beginning the 3d year after implementation of the regulations.
[3] Total monitoring costs due to violations spread over a 5-yr period.

NOTE.– Totals may not add due to rounding.

1.3.2 Treatment costs. Once the monitoring program is initiated, some systems will find that they exceed one or more maximum contaminant levels (MCL). These systems will then be faced with an additional cost in order to meet the required MCL. There are several alternative routes which a system can pursue in order to comply with the Regulations. Some of the alternatives include:

1. Installing treatment facilities capable of reducing the MCL to an acceptable level;

2. Developing a new source of supply of better quality;

3. Purchasing better quality water from another water utility; or

4. Merging the system with one or more adjoining systems which have a higher quality supply.

If none of the above are feasible, a system can apply for a variance or exemption to the MCL under the provisions of the Interim Primary Regulations. Therefore, the costs incurred by a water supply in reducing the concentration of a contaminant to an acceptable level are site specific and will depend on such factors as, treatment facilities available, age of system, proximity of other suppliers, source of water, and many other inter-related problems.

However, in projecting national costs for treatment the option of installing treatment facilities was assumed to be the method systems would select to provide safe drinking water.

The following basic assumptions are implicit in developing costs for the treatment options:

1. Surface water systems not presently clarifying will install some form of filtration;

2. Approximately 30 percent of the community water systems not presently disinfecting will install chlorination units;

3. Advanced treatment is necessary to remove inorganics;

4. Estimates of the number of MCL violations were based on 1969 Community Water Supply Study, except for mercury. Mercury violations were based on recent EPA studies.

The national treatment costs for public water systems are summarized in Table 1–7. The majority of costs, if all systems elect to treat for contaminant violations, will be incurred in order to meet the turbidity and inorganic requirements of the interim regulations. Ranges were developed for capital costs only. This range is based on making two assumptions for daily flow. If a system were required to install treatment, it would have to consider sizing their new components to reflect average daily flow conditions or maximum daily flow conditions in cases where system storage is not adequate. Whatever sizing option a system selected it is unlikely that significant additional operation and maintenance expenses would result.

TABLE 1–7.—*National costs of treating contaminants in drinking water*

[In millions of dollars]

Treatment technology	Contaminant	Capital costs	Annual operation and maintenance
Community systems:			
Clarification	Turbidity	879– 983	199
Chlorination	Coliform	17– 27	7
Ion Exchange	Ba, Cr, Cd, NO³, Hg, Se	619– 697	51
Activated alumina	As, fluoride	31– 53	11
pH Control	Pb	3– 4	.1
Subtotal		1049–1764	269
Non-community systems:			
Clarification	Turbidity	10	1
Chlorination	Coliform	14	3
Subtotal		24	4
Total		1073–1788	273

NOTE.—Totals may not add due to rounding.

1.4 *Economic impact of the interim primary drinking water regulations*

The expenditures required to comply with the Interim Primary Regulations will have an impact on all water users served by public water supplies covered by the Safe Drinking Water Act. All persons served by these systems will feel the impact of monitoring costs to some extent. However, the most noticeable impact of the regulations will be on users of public water systems that do not meet the MCL requirements of the regulations.

An estimate of the total annual costs of capital, operation and maintenance, and monitoring necessary to comply with the Regulations is shown in Table 1–8.

TABLE 1–8.—ESTIMATED TOTAL ANNUAL COSTS OF IMPLEMENTING THE INTERIM PRIMARY DRINKING WATER REGULATIONS FOR PUBLIC WATER SUPPLY SYSTEMS IN MILLIONS OF DOLLARS [1]

Annual capital [2]	146–247
Annual operation and maintenance	263
Annual monitoring (routine only)	17–35
Total annual	426–545

[1] 1975 dollars.

[2] Assumes capital costs amortized over 15 years at 7-percent interest.

1.4.1 *Water supply economics.* The price consumers pay for water is determined, in general, by costs the utility incurs to operate and maintain the system. However, some publicly-owned water systems may have their costs and revenues conglomerated with the cost of other municipal services, and the water bill paid by the consumer may not completely reflect the status of the water system alone.

Water system rate structures vary from system to system, and may also differ for various user classes within the same system. There are four basic types of rate structures which are used around the country. Some systems use a "normal block" structure which results in lower unit costs to customers that use high volumes of water. In the "inverted block" structure, higher units costs are imposed upon customers who use higher volumes of water. Under a "flat" rate structure, there is one single charge per unit for all customers regardless of use. Generally, the flat rate structure applies to residential customers only. Finally, in the "non-incremental" rate structure, the unit cost of water is based on the number of water consumption units owned by the user.

Prices charged for water are usually regulated by a State or local commission appointed to evaluate the need for rate hikes. In most States, investor-owned utilities are under the jurisdiction of State regulatory commissions. Publicly-owned utilities are either regulated by local boards or are unregulated. Any lengthy lag time between rate increase requests and rate increase approvals may pose problems in the implementation of the interim regulations.

Most water utilities, both public and private, finance large capital investments by retaining profits or acquiring debt. Publicly-owned systems may have access to municipal funds or can sell either general obligation or revenue bonds to be repaid from general revenues or water revenues. Private, investor-owned systems may issue stocks and bonds, and unlike publicly-owned systems, their credit ratings are dependent on the profitability of their own operations. Since interest rates are generally proportional to risk, water utilities in more secure financial positions can borrow money at lower interest rates. At the present time the interest rates on municipal bonds is 4–6 percent while the rate for debt issues of private-owned utilities is 6–8 percent.

In the water industry there does not seem to be a correlation between present debt levels and long-term financial soundness. Although a majority of water systems today have debt ratios ranging upward from 40 percent, almost one-fourth of the water systems are presently debt-free. Approximately 85 percent of these debt free systems serve communities of less than 5,000 people. However, many of these small systems do not have a positive net income, while larger water systems with high debt to book value ratios do have positive net income.

Records indicate that per capita consumption of water tends to decrease following significant increases in water rates. Among individual users the decrease would occur where there is a high elasticity of demand; e.g., lawn sprinkling. Industrial and commercial users have shown no elasticity to price increases. If demand declines sharply after initial rate hikes and total revenues do not increase enough to cover increased cost, a second rate increase may be necessary.

1.4.2 *Per capita costs.* Monitoring costs vary with the size of the water system involved. The number of samples for routine bacteriological monitoring is a function of the number of persons served. For community supplies the number of samples can range from a minimum of 1 sample per quarter for systems serving 1000 people or less to a maximum of 500 samples per month for systems serving more than 4,690,000 people. For non-community supplies only one sample per quarter is required.

In general, the annual impact of routine chemical monitoring will vary depending on the frequency of sampling rather than the number of samples. The frequency of sampling will depend on the system type: ground water vs. surface water; community system vs. non-community. The annual monitoring costs on a per capita basis are shown in Table 1–9. The per capita costs for the smallest community system (25 persons served) are high in comparison to other system sizes. However, there are very few systems in this category and the States may desire to enter into institutional arrangements to lessen their annual monitoring burden.

TABLE 1–9.—*Annual monitoring costs per person served versus system size and type for community water system*

System size	System type	
	Surface	Ground
25	$7.20–$15.05	$1.25–$1.55
100	1.80– 3.75	.85– 1.75
500	.35– .75	.15– .35
1,000	.20– .40	.10– .20
2,500	.15– .30	.05– .10
5,000	.10– .25	.05– .15
10,000	.10– .20	.05– .15
100,000	.05– .15	.05– .15
1,000,000	(1)– .05	(1)– .05
10,000,000	(1)	(1)

[1] Less than $0.05.

However, treatment costs may be responsible for much higher per capita cost increases than monitoring costs. As indicated earlier, public water systems not meeting the MCL requirements of the interim regulations will incur the major cost burden. The impact of the treatment costs will also vary with the size of the water system involved. Table 1–10 summarizes the treatment costs as they affect systems of different sizes.

It should be pointed out that the per capita costs displayed in Table 1–10 are weighted averages. Treatment costs have been weighted by the projected frequency of the various treatment techniques within each size subcategory. By its nature, the weighted average does not give a true representation of the costs to a particular consumer. In all categories, there are five treatments possible with a wide variation in costs. In Table 1–11, the range of annual per capita monitoring and treatment costs are presented. From this table it can be seen that the annual per capita treatment costs for disinfection are expected to range from $3.85 to $3.10 in the Smallest system category, from $2.75 to $0.20 in the Small system category and so on.

	Smallest systems (25 to 99 people served)	Small systems (100 to 9,999 people served)	Medium systems (10,000 to 99,999 people served)	Large systems (over 100,000 people served)
Annual capital costs (in millions)	$3.80–$6.40	$60.20–$101.40	$52.30–$88.10	$30.50–$51.36
Annual operation and maintenance costs (in millions)	2.10	48.00	74.10	124.10
Annual monitoring costs (in millions)	.30–.60	.60–1.30	1.20–2.50	1.30–2.90
Total annual costs (in millions)	6.20–9.10	109.40–151.30	127.60–164.70	165.90–188.20
Weighted average cost per capita per year	37.00–54.00	11.00–15.00	9.00–12.00	10.00–11.00
Increase in household monthly water bill [1]	9.60–14.05	2.85–3.95	2.35–3.05	2.55–2.90

[1] Assumes 3.11 persons per household and that all increases in costs are passed on to the consumer.

TABLE 1–11.—*Annual per capita treatment and monitoring cost ranges for 4 size categories*

	Smallest systems (25 to 99 people served)	Small systems (100 to 9,999 people served)	Medium systems (10,000 to 99,999 people served)	Largest systems (over 100,000 people served)
Treatment: [1]				
Disinfection	$3.85–$2.10	$2.75–$0.30	$0.45–$0.15	$0.25
Turbidity control	152.00–52.00	78.00–16.00	20.00–12.50	15.00
Heavy metal removal	237.00–101.00	142.00–25.50	35.00–13.00	18.00
Lead control	2.60–1.20	1.80–.30	.40–.20	.30
Fluoride/arsenic removal	11.80–7.85	11.30–3.15	5.00–3.15	3.55
Monitoring	15.80–.85	3.75–.05	.20–.05	.15

[1] Lower cost limit based on assumption that treatment plant built to treat average daily demand and upper cost limit based on maximum daily demand, except for the smallest systems category where costs are based on average daily demand only.

1.4.3 *Impact analysis.* As Table 1–10 and Table 1–11 demonstrate, the potentially most severe impact could occur for users of the smallest or small systems. Assuming that treatment and monitoring costs are directly passed on to the consumer, the monthly water bill for a household in the smallest systems, may increase on the average between $10 and $14.

However, as noted earlier, these systems may choose not to install treatment facilities in order to comply with the regulations. Several options are available to them:

1. Developing a new, less contaminated source;
2. Joining a regional system;
3. Purchasing treated water; or
4. Blending water from existing source with water of higher quality.

The exemption and variance provisions of the Act provide for temporary immunity from the regualtions on the basis of economic hardship or technical difficulties. Federal loan programs may also ease the impact on users of small systems. The Farmers Home Administration sponsors a loan and grant program to aid the financing of water and sewer system construction in small communities. The loans are offered at low interest rates and with long repayment schedules. The Safe Drinking Water Act also authorizes a loan guarantee program for small systems. These programs will reduce community costs, but they will not completely mitigate the possibility of high cost impacts on households in small systems.

It is not certain how systems will finance the costs associated with these regulations—either through higher taxes or higher water rates—but it is certain that the Interim Drinking Water Regulations will have the gratest impact on those served by smaller water systems. Further study is underway to determine if financing will be a serious problem for large or small systems.

At the present time EPA believes that the economic impact of the construction requirements will be spread over at least a four-year period from the promulgation of the regulations because the regulations will not result in immediate compliance. The effective date of the regulations will be 18 months after promulgation. Non-compliance may not be discovered until initial sampling has been completed. For community water supplies the deadlines for initial sampling range from 1 day for turbidity to 2 years for inorganic samples of ground water systems after the effective date. Therefore, in some cases, more than 3 years from promulgation could elapse before inorganic violations would be detected and corrective actions initiated. In addition the use of the exemption or variance provisions of the regulations could further prolong compliance for public water systems unable to comply for economic or technical reasons.

It is estimated that the investor-owned water systems will pay approximately one-fourth of the total treatment costs, while the publicly-owned companies would pay the remainder. However, since many of the investor-owned systems serve very small populations, the capital demands on these systems could be great.

In 1974, the water supply industry spent approximately $1.5 billion for capital improvements. The average yearly total annual capital costs mandated by the Interim Primary Regulations are estimated to be about 13 to 24 percent of this figure. It is anticipated that the industry as a whole would be able to raise the additional necessary capital. Small systems could encounter difficulty in financing new treatment facilities, particularly when clarification, a relatively expensive treatment process, is required. The implementation of these Regulations may force many communities to allocate funds, which may be needed to provide other services to the community, for the treatment of their drinking water.

Data on non-community systems is sparse. However, it is not anticipated that these regulations will have a serious economic impact on them.

The macroeconomic effects of the Interim Primary Drinking Water Regulations are expected to be minimal. On the average, the regulations will cause an increase in water rates of 9.5 percent spread over several years. If this increase occurred in one year, the resulting increase in the Consumer Price Index (CPI) would be less than 0.001 percent. Since the costs of these regulations will be incurred over several years, the average annual increase in the CPI will be even less. The Chase Econometric model was used to examine the impact of all existing pollution abatement regulations.[1] The analysis showed that there will be an average annual increase in the CPI for 1974 to 1980 of less than 0.1 percent due to these pollution abatement regulations.

1.5 *Constraints to implementation of the interim primary drinking water regulations.* The implementation of the National Interim Primary Drinking Water Regulations within a reasonable time frame would greatly depend on the availability of key chemicals and supplies needed in the treatment of drinking water; availability of manpower to operate treatment facilities; adequate laboratory capability to conduct sample analyses; and sufficient supply of engineering and construction services to build or improve treatment facilities.

In particular, the Interim Regulations will increase demand for coagulants and disinfecting agents as the needed treatment facilities are completed. An increased demand could cause some temporary dislocations in chemical markets, but in the long-run, increased demand will result in an expansion of supplies. It is projected that the 1980 demand for ferric chloride may reach 115 to 120 percent of the present production, while alum demand will be approximately 115 percent of current production. There is a general consensus of opinion that organic polyelectrolytes will become the dominant flocculating agents in the future. However, there are no reliable estimates of which polyelectrolyte(s) will be dominant and when the shift in chemical usage will occur.

At the present time there are approximately 180,000 people employed in the water supply industry. With the implementation of the Interim Primary Drinking Water Regulations between 13,000 and 27,000 additional personnel would be needed nationwide. These personnel would be required to perform such tasks as monitoring and enforcing the Regulations, operating the required treatment facilities, performing laboratory analysis of water samples, program assistance and program administration. It is anticipated that water systems may have difficulty hiring qualified personnel.

The third potential constraint is in the availability of adequate laboratories to perform the required chemical and biological analyses. Coliform monitoring is now being performed at State, local and private laboratories. In meeting the coliform monitoring requirements, water suppliers should not have difficulty finding laboratory facilities. At the present time there is little routine monitoring being done for heavy metals and organic compounds of concern in the Regulations. However, there are adequate numbers of public and private laboratories capable of performing these analyses although State certification of laboratories, required by the regulations, could constrain available laboratory facilities.

The final area where constraints could occur is in the design and construction of the required treatment facilities. Although the annual cost of required new construction represents less than 0.4 percent of the present total annual new construction in the United States, design and construction of new water treatment plants is highly specialized. Some communities, especially those in rural areas, may have difficulty obtaining these services due to their expense or unavailability.

[1] Chase Econometric Associates, Inc. "The Macroeconomic Impacts of Federal Pollution Control Programs," prepared for the Council of Environmental Quality and the Environmental Protection Agency, January 1975.

1.6 *Limits of the analysis.* In developing the cost estimates used in this study, it was necessary to use several simplifying assumptions. This section explores these assumptions and what their overall impact might be.

The first assumption is that there are 40,000 community water supply systems in the nation and that they are represented accurately by the current EPA inventory of community water supply systems. There is some evidence that when the inventory is completed there will be a total of 50,000 community systems rather than the estimated 40,000. This increase in systems would cause an increase in monitoring costs of about 12 percent and a similar increase in treatment costs.

All costs for public non-community systems were based on the assumption that there are 200,000 of these systems nationwide. At the present time there is no accurate inventory of these systems, thus, this number is solely an estimate. It is anticipated that the EPA will be performing an inventory of these systems in the next few years so that these estimates can be updated.

A major consideration not used in developing treatment costs is that many systems may use alternative water management practices rather than install more costly treatment processes when they exceed an MCL requirement. For example, ground water systems might blend water from a "clean" well with that from a "dirty" well so that the resultant water will not exceed the MCL. Similarly, no estimate is possible to determine the possible benefits which might result from cascading treatment processes. An example of this is that clarification units might remove enough heavy metals so that the MCL might not be exceeded. These treatment alternatives would vary from site to site so that it is impossible to quantify the benefits which would be derived.

1.7 *Energy use.* It is estimated that approximately 21,200 billion BTU's per year will be required to operate plants and produce chemicals for the various treatment systems necessary for the 40,000 community systems to meet the regulations. This is about 0.028 percent of the 1973 national energy consumption, based on the 1974 Statistical Abstract. The increase in energy use will depend on a number of factors, including whether pollution in surface sources of waters is successfully controlled. There will be no direct energy savings from the recommended action.

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PART 141—NATIONAL INTERIM PRIMARY DRINKING WATER REGULATIONS

Subpart E—Special Monitoring Regulations for Organic Chemicals

Pursuant to Sections 1445(a) and 1450(a)(1) of the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523, the Administrator of the Environmental Protection Agency hereby issues a new 40 CFR 141, Subpart E, to become effective immediately. This subpart establishes sampling, monitoring, testing and other requirements applicable to designated public water systems for the purpose of providing data for the establishment of maximum contaminant levels of organic contaminants in drinking water.

Concurrently with this publication, EPA is promulgating National Interim Primary Drinking Water Regulations under the authority of the Safe Drinking Water Act ("SDWA"). Those regulations contain maximum contaminant levels, monitoring frequencies and analytical procedures for microbiological contaminants, turbidity, and selected inorganic and organic chemicals. The Interim Primary Drinking Water Regulations are to become effective 18 months after promulgation.

EPA is embarking on an intensive research program to find answers to the following questions:

1. What are the effects of commonly occurring organic compounds on human health?

2. What analytical procedures should be used to monitor finished drinking water to assure that any Primary Drinking Water Regulations dealing with organics are met?

3. Because some of these organic compounds are formed during water treatment, what changes in treatment practices are required to minimize the formation of these compounds in treated water?

4. What treatment technology must be applied to reduce contaminant levels to concentrations that may be specified in the Primary Drinking Water Regulations?

This research will involve health-effects and epidemiological studies, investigations of analytical methodology, and pilot plant and field studies of organic removal unit processes. Some phases of the research are to be completed by the end of this year, while much of the remainder are to be completed within the next calendar year.

Subpart E is intended to provide a rapid means of obtaining data in support of the possible establishment of additional maximum contaminant levels for organic chemical contaminants of drinking water, either as individual compounds or groups of compounds. These regulations will form the basis of a wide-ranging monitoring and analytical study to be performed by EPA in conjunction with the States and designated participating public water systems. These regulations will also generate information on the occurrence of potentially hazardous organic chemicals in a cross-section of public water systems covering a substantial portion of the population of the United States and representing various types of drinking water sources and treatment processes. They will provide information which is currently lacking on the actual distribution of a number of organic chemicals and will make it possible for EPA to attempt to correlate the presence of these chemicals with the results of several general and chemical group analytical procedures. This information will aid in the development of future primary drinking water regulations.

The recently completed National Organics Reconnaissance Survey (NORS) reported detection of six volatile organic compounds in a sampling of 80 cities. Extensive additional gas chromatographic/mass spectrometric analyses were performed on 10 of these 80 water systems. However, these were one-time samples and therefore do not indicate seasonal effects on drinking water quality nor any other temporary factors such as intermittent discharge or the long term effects of treatment applications in controlling finished water quality. The special study covered by these regulations was derived, in part, from the preliminary results obtained in the NORS Survey and is intended to respond to many of the questions which it raised so that the appropriate regulatory actions may be determined. Many of the systems from the previous survey will be resampled several times during this period to provide an indication of longer-term and seasonal variations in the quality of drinking water.

This study will include analyses for approximately 20 specific organic compounds deemed to be candidates for particular concern, and analyses of 6 surrogate group chemical parameters which are indicators of the total amount of organic contamination. Several of these surrogate procedures show promise as indicators of specific families of compounds such as chlorinated (halogenated) organics or aromatic compounds. They also show promise as practical methods which could be developed and widely applied for surveillance and quality control of drinking water in many water systems, particularly those public water systems which are not large enough to be financially capable of providing highly sophisticated computerized gas chromatographic/mass spectrometric analyses.

In order to assure a rapid and efficient method of providing data of uniform and assured quality, EPA will assume the principal responsibility for analysis and evaluation of the water samples taken by the designated public water systems. The water systems involved may be required to provide background information and follow-up investigation as necessary.

EPA feels that this monitoring study, in conjunction with its other substantial research efforts, will provide the basis for a coherent and rational approach to the control of organic chemical contamination of public water systems.

Good cause exists for promulgation of these regulations without first asking for comment on them, in view of the widespread public concern, the need to move as quickly as possible to carry out the Congressional mandate to deal with organic chemicals, and in view of the fact that the burden imposed on designated public water systems is limited.

Organic Chemicals To Be Surveyed

The basic monitoring study will be completed within one year and will involve multiple samplings from each designated system. Water samples and concentrates will be collected on site and shipped to EPA laboratories for analysis.

The study will consist of analyses for a number of organic compounds and 6 surrogates in approximately 100 public water systems in the United States. Many of the compounds to be selected for inclusion in this study will be halogenated and aromatic organic compounds. Virtually no chlorinated organic

compounds are known to occur naturally in fresh water. Many are considered to be liver toxins and/or potential carcinogens in some concentration. It would be expected that any chlorinated organic compounds found in drinking water would have been generated either from industrial manufacturing operations, agricultural operations, or during chlorination of water for the purpose of disinfection. Many aromatic compounds are also considered to be chronic toxicants and some have been shown to be carcinogens in test systems such as animal feeding. Aromatic compounds might also reach drinking water systems from industrial sources, urban surface runoff, or from atmospheric fallout of materials generated during combustion processes. Other possible candidates include aromatic amines and nitrosamines.

The compounds to be studied are being selected on the basis of available toxicity data, information on possible occurrence in public water systems with significant frequency, and the availability of practical analytical methods for identification and quantification. They may include: benzene; carbon tetrachloride; p-dichlorobenzene; vinyl chloride; 1, 2, 4-trichlorobenzene; bis-(2-chloroethyl) ether; 1, 1, 2-trichloroethylene; 2, 4-dichlorophenol; fluoranthene; 11, 12-benzofluoranthene; 3, 4-benzofluoranthene; 1, 12-benzoperylene; 3, 4-benzopyrene; indeno (1, 2, 3-cd) pyrene; chloroform; bromodichloromethane; bromoform; 1, 2-dichloroethane; polychlorinated biphenyls; and pentachlorophenol. Additional studies will be performed on aromatic amines (e.g. benzidine) and nitrosamines.

In addition to the analyses of specific compounds, a number of analyses of general organic indicators will be performed in order to determine possible relationships between the presence of the specific chemicals and certain general surrogate analytic procedures which should be more applicable for routine monitoring in public water systems. The following general indicators will be used:

(1) Total Organic Carbon analysis offers promise as a general organic measurement parameter for drinking water and is already widely accepted in the area of waste treatment organics monitoring. The procedure indicates the total amount of organically bound carbon present in the sample and is not selective among types of compounds. The technique essentially consists of oxidation of the organic chemicals in a water sample to carbon dioxide which is either quantified directly or converted to methane which is then quantified. Sample collection is simple, analysis is rapid (10 minutes) and may be automated, cost per sample is low, and interference from inorganic carbon can be avoided. Reliable and accurate instrumentation is now becoming available for application of this procedure to drinking water.

(2) The Ultraviolet and Fluorescence Spectroscopic methods, which primarily indicate the presence of aromatic compounds. The advantages of these methods are sampling simplicity, the small sample size required, and the speed and low cost per sample.

(3) Color analyses, which are relatively simple and rapid methods which may indicate the presence of certain organic compound types, particularly humic substances. Some recent data indicate that a relatively quantitative relationship may exist between color intensity and the quantity of humic substances which represent the largest portion of dissolved organic chemicals in some waters.

(4) Total Organic Chlorine analyses, which offer promise for rapid, accurate indication of the presence of all chlorine-containing organic compounds. This procedure involves oxidation of the halo-organics in a water sample followed by microcoulometric quantification. The analysis is rapid after sample concentration. The present apparatus has not generally been applied to drinking water, but EPA is conducting a concurrent program to develop the application so that this potentially important method may be utilized in this monitoring study.

(5) The Carbon-Chloroform Extract procedure (CCE), which consists of passage of 60 liters of water through a carbon column at a constant rate for 48 hours. The carbon adsorbant is then extracted with refluxing chloroform followed by removal of most of the chloroform and evaporation of the residue to constant weight. The entire analytical process requires about 6 days for completion and the concentrates represent something less than 10% of the total organics content of the sampled water. Therefore, CCE is not amenable to on-line process control monitoring. However, in this study, this CCE data and historical CCE data will be interrelated with specific compound analyses and the other surrogate analyses, to designate the optimum monitoring methodologies for field use which are most indicative of the presence of those organic compounds which potentially pose risks to human health.

Other methods of sample collection and concentration which are being evaluated for this and concurrent studies include the use of macroreticular resins which have shown promise for application to drinking water analytical technology.

Within two weeks from the publication of this subpart, in consultation with the States, EPA will designate approximately 100 public water systems for inclusion in the special monitoring program for organic chemicals. The systems will be selected to represent each major type of water supply (rivers, impoundments and ground water), quality of water, treatment, region and population size. Most of the systems should serve large metropolitan areas, but some may be small enough to be representative of the water types and problems associated with smaller systems. The number of systems to be selected will be sufficient to permit an evaluation of the relationship of specific contaminant concentrations to several general organic parameters.

EPA in consultation with the State will work closely with each system to assure that proper sampling techniques are used. In addition, when preliminary results indicate that a potentially harmful organic chemical is present in significant amounts in a particular water system, EPA and the State will consult with the system and provide technical advice and assistance where appropriate. In some cases, it may be possible to identify a particular point source which is causing serious contamination of a public water system, or to determine that additional treatment should be installed by a system without waiting for the nationwide survey results.

For the reasons given above, Chapter 40 of the Code of Federal Regulations is hereby amended by adding Subpart E to Part 141, as follows. The new regulations take effect December 24, 1975.

Dated: December 10, 1975.

RUSSELL E. TRAIN,
Administrator.

§ 141.40 Special monitoring for organic chemicals.

(a) The Administrator may designate, by publication in the FEDERAL REGISTER, public water systems which are required to take water samples, provide information, and in appropriate cases analyze water samples for the purpose of providing information on contamination of drinking water sources and of treated water by organic chemicals.

(b) The Administrator shall provide to each public system designated pursuant to paragraph (a) of this section a written schedule for the sampling of source water or treated water by the system, with written instructions for the sampling methods and for handling of samples. The schedule may designate the locations or types of locations to be sampled.

(c) In cases where the public water system has a laboratory capable of analyzing samples for constituents specified by the Administrator, the Administrator may require analyses to be made by the public water system for submission to EPA. If the Administrator requires the analyses to be made by the public water system, he shall provide the system with written instructions as to the analytical procedures to be followed, or with references to technical documents describing the analytical procedures.

(d) Public water systems designated by the Administrator pursuant to paragraph (a) of this section shall provide to the Administrator, upon request, information to be used in the evaluation of analytical results, including records of previous monitoring and analyses, information on possible sources of contamination and treatment techniques used by the system.

(Secs. 1445 and 1450 of the Public Health Service Act, 88 Stat. 1660 (42 U.S.C. 300j–4 and 300j–9))

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